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PROCEEDINGS

OF THE

Biological Society of Washington

VOLUME XVII

1904

WASHINGTON
PRINTED FOR THE SOCIETY
1905

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ERRATUM.

Page 55, line 1 (in head), instead of Vol. XVII, p. 55–77, read Vol. XVII, pp. 55–78.

OFFICERS AND COUNCIL

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BIOLOGICAL SOCIETY OF WASHINGTON

For 1904

(ELECTED DECEMBER 26, 1903)

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VOL. XVII, PP. VII-XII JANUARY 20, 1905

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets in the Assembly Hall of the Cosmos Club on alternate Saturdays at 8 P. M. Brief notices of the meetings, with abstracts of the papers, are published in *Science*.

January 9, 1904—380th Meeting.

The President in the chair and 57 persons present.

F. A. Lucas noted the occurrence of *Mustela pennanti* as a fossil in Pennsylvania.

B. W. Evermann exhibited a collection of labels used by the canners of the Pacific coast for labeling canned salmon.

The following communications were presented:

F. V. Coville: Desert Plants as a Source of Drinking Water.*

V. K. Chesnut: Death Gulch of the Yellowstone Park.

O. F. Cook: An Exogenous Palm from Guatemala.

January 23, 1904—381st Meeting.

The President in the chair and 36 persons present.

The following communications were presented:

E. W. Nelson: A Winter Trip in Mexico.†

B. W. Evermann and W. C. Kendall: An Interesting Fish from the High Mountains of Central Ecuador.

* Ann. Rept. Smithsonian Inst. for 1903, pp. 499–505, figs. 1–4, pls. 1–11, 1904.

† Nat. Geog. Mag., XV, p. 341, Sept., 1904.

February 6, 1904—382nd Meeting.

The President in the chair and 105 persons present.

The following communications were presented :

Ernest T. Seton : A Study of the Pocket Gophers, the Fertilizers of the West.*

Ernest T. Seton : Scars on the Quaking Aspen.

March 5, 1904—383rd Meeting.

The President in the chair and 85 persons present.

The following communications were presented :

A. K. Fisher : The Birds of Laysan Island.†

J. N. Rose : Revision of the North American Crassulaceae.‡

March 19, 1904—384th Meeting.

The President in the chair and 45 persons present.

C. E. Waters exhibited series of common ferns showing gradations from sterile to fertile fronds.

The following communications were presented :

B. W. Evermann : A Series of Colored Drawings of Hawaiian Fishes.§

W. P. Hay : The Life History and Economic Importance of the Blue Crab.§

Walter H. Evans : An Evident Case of Parthenogenesis in *Begonia*.

O. F. Cook : Natural Selection in Kinetic Evolution.

April 2, 1904—385th Meeting.

The President in the chair and 46 persons present.

F. A. Lucas exhibited lantern slides showing photographs of living animals taken by flashlight.

The following communications were presented :

H. W. Oldys : The Use of Our Musical Scale by Birds.

W. H. Osgood : The Caribou of Alaska.

* Century Magazine, LXVIII, pp. 300–307, June, 1904.

† See W. K. Fisher, Bull. U. S. Fish Comm. for 1903, pp. 1–39, pls. I–X.

‡ See Britton and Rose, Bull. N. Y. Bot. Garden, III, No. 9, Nov. 11, 1903, and Smithsonian Misc. Coll. (Quart. Issue), XLVII, pt. 2, pp. 159–162, pl. XX, 1904.

§ To be published by U. S. Bureau of Fisheries.

M. W. Lyon, Jr.: Classification of the Hares, Rabbits and Pikas.*

M. C. Marsh: The Gas Disease in Fishes.†

April 16, 1904—386th Meeting.

The President in the chair and 25 persons present.

Carleton R. Ball exhibited specimens of *Lamium amplexicaule* showing cleistogamous flowers produced in early spring.

The following communications were presented:

W. R. Maxon: Some Jamaican Termite Nests.

Vernon Bailey: A Simple Method of Preserving Tracks.

E. L. Morris: The History and Reproduction of the Bush Morning-Glory.‡

E. S. Steele: The Globose Headed Laciniarias.

April 30, 1904—387th Meeting.

The President in the chair and 30 persons present.

The following communications were presented:

C. L. Marlatt: Individual and Specific Characters in Minute Insects as shown under the Microscope.

E. W. Nelson: Notes on the Habits of Two Remarkable Fish from Southern Mexico.

Geo. T. Moore: The Fixation of Atmospheric Nitrogen by Bacteria.§

May 14, 1904—388th Meeting.

Vice-President Palmer in the chair and 8 persons present.

No program presented.

October 22, 1904—389th Meeting.

Vice-President Hay in the chair and 23 persons present.

The following communications were presented:

E. A. Schwarz: The Insect Catching Grass of Cuba.‖

* Smithsonian Misc. Coll. (Quart. Issue), XLV, pp. 321–447, pls. LXXIV-C, June 15, 1904.

† To be published by U. S. Bureau of Fisheries; see also Trans. Amer. Fisheries Soc., p. 192, 1904.

‡ Plant World, VII, pp. 109–113, pls. V–VI, May, 1904.

§ Bacteria and the Nitrogen Problem, Yearbook U. S. Dept. Agric., pp. 333–342, 1903.

‖ To be published in Proc. Entomolog. Soc. Wash., VII, No. 1, Jan., 1905.

J. N. Rose: A Very Curious Plant from Mexico.

Theo. Gill: The Segregation of Freshwater Fishes.

A. B. Baker: Exhibit of Living Animals at the St. Louis Exposition.

November 5, 1904—390th Meeting.

Vice-President Hay in the chair and 46 persons present.

Ch. W. Stiles spoke briefly of the meeting of the International Committee on Zoological Nomenclature in Berne.

The following communication was presented:

Gen. T. E. Wilcox: The Flora of the Western United States and Alaska.

November 19, 1904—391st Meeting.

The President in the chair and 34 persons present.

B. W. Evermann spoke of the abundance of waterfowl at Lake Maxinkuckee, Indiana, about November 5, 1904.

The following communications were presented:

E. L. Greene: A Chapter in the Evolution of Generic Nomenclature.

David White: A New Seed-bearing Fern.*

December 5, 1904—392nd Meeting.

The President in the chair and 35 persons present.

G. K. Gilbert exhibited photographs and specimens of the bark of the aspen tree showing marks made by the claws of bears and other animals.

The following communications were presented:

H. W. Oldys: Some New Bird Songs.

W. H. Dall: The Relations of the Non Marine Mullusk Fauna of Alaska.†

B. W. Evermann: A Trip to Mount Whitney.

* The Seeds of *Aneimites*, Smithsonian Misc. Coll. (Quart. Issue), XLVII, pp. 322–331, pls. XLVII–XLVIII, 1904.

† To be published in Popular Science Monthly.

December 17, 1904—393rd Meeting.

The President in the chair and 38 persons present.

The following communications were presented:

E. L. Greene: The Earliest Systematic Book of Botany.

A. B. Baker: Animals Recently Received at the National Zoological Park from Abyssinia and South America.

Hugh M. Smith: The Japanese Dwarf Salmon and the Fishing Therefor with Trained Cormorants.*

December 31, 1904—394th Meeting.

The President in the chair and 24 persons present.

The annual reports of the Recording Secretary and the Treasurer were read and accepted. The following officers were elected for the year 1905:

President: Frank H. Knowlton.

Vice-Presidents: E. L. Greene, W. P. Hay, E. W. Nelson, T. S. Palmer.

Recording Secretary: Wilfred H. Osgood.

Corresponding Secretary: Edward L. Morris.

Treasurer: David White.

Councillors: A. K. Fisher, A. D. Hopkins, J. N. Rose, L. Stejneger, H. J. Webber.

The President announced the appointment of the following standing committees for the year 1905:

Committee on Publications: W. P. Hay, David White, W. H. Osgood, E. A. Goldman, C. A. McKnew.

Committee on Communications: Vernon Bailey, A. B. Baker, A. D. Hopkins, J. N. Rose, H. M. Smith.

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* To be published by the U. S. Bureau of Fisheries; see also Trans. Amer. Fisheries Soc., p. 101, 1904.

VOL. XVII, PP. 1-16 FEBRUARY 5, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SYNOPSIS OF THE GENERA, SUBGENERA AND SECTIONS OF THE FAMILY PYRAMIDELLIDÆ.

BY WILLIAM HEALEY DALL AND PAUL BARTSCH.

The Pyramidellidæ, a family of Mollusks mostly of small size and world-wide distribution, occur fossil first in the Cretaceous, are numerous in the Tertiary, but perhaps are most fully developed in the existing faunas. Very numerous names have been applied to them, sometimes under the impression that the pillar is not plicated in a particular group, a mistake which, by grinding down the whorls, can be corrected; the missing plications being present but falling a little short of reaching a point in the aperture where they are visible externally. In all the forms of which the soft parts are known the external anatomy is very similar. In examining a large series of forms, as noted by Fischer, intermediate types appear until it becomes a matter of great difficulty to decide where, if anywhere, the generic lines can be drawn, and it is not surprising that some authors have fallen back on the expedient of regarding most of the species, notwithstanding the contrasting extremes, as belonging to a single genus. Where a group is composed of such a multitude of species it seems more convenient in practice and leads more efficiently to clear thinking, to take the other view, and subdi-

vide the groups sufficiently to make it reasonably clear where a given species belongs in the series.

In the absence of anatomical characters it has been necessary to fall back in large part on the form, ornamentation, and plications of the pillar, as distinctive characters, even while we admit that between the different sections some intermediate forms may occur. So many names have been applied to members of the group that in most cases it has not been necessary to coin new denominations. The synonymy, which is very involved, is reserved for another paper in which the species of the west coast of America will be monographically treated. It was thought best to put on record the classification adopted, so that before the paper referred to appears the authors may have the benefit of criticism from other students. Many of the specific names given in the past have been repeatedly used for different species, rendering it necessary in many cases to give new ones. In all cases the synonymy adopted has been based on researches which have begun with the typical species of the original authors, which in some of the most anciently named forms has involved no little labor. Wherever any doubt existed in regard to the characters the specimens have been ground down until the pillar has been made visible over a great part of its extent, and in all cases the characters recorded are the result of microscopic study. Only a few of the many named forms have been inaccessible, as the collection of the U. S. National Museum is remarkably rich in species of this group.

The senior author thinks it only just to state that by far the greater part of the work is due to his associate, who has for several years given unwearied attention to these minute and difficult objects of study. The facilities of the National Museum have been constantly at the disposition of the writers, and most of the types are contained in its collection, though thanks for material lent for study are due to the Academy of Natural Sciences of Philadelphia, the authorities of Amherst College, the Zoological Museum of Copenhagen, and numerous private students to whom a fuller acknowledgment will be made in the monograph already alluded to, which is nearing its completion.

The name *Obeliscus* appeared in the Museum Calonnianum in 1797, without a diagnosis or figure. This work is anonymous,

and this has been regarded as a sufficient reason for rejecting this and other names contained in it, as it is known that Humphrey, who was an auctioneer and dealer, usually credited with the authorship, is not the author, and the work itself is of no scientific value.

Family **Pyramidellidæ.**

Gastropods with the radula absent or obsolete; the operculum ovoid, paucispiral, with the apex anterior, a thread-like arcuate ridge on the proximal side, the inner margin notched in harmony with the plaits of the pillar when prominent; foot short, moderately pointed behind, with a small operculigerous lobe above and sometimes a small tentacular appendix on each side, in front feebly auriculate or undulate; mantle feebly canaliferous on the right upper margin; a single branchia; verge sub-cylindric, elongate; head with two flattened subtriangular or elongate tentacles, connate, grooved or auriform in the larger forms, the funicles with a ciliated area; below the tentacles an oral orifice from which extends a long retractile subcylindric proboscis, but there is no muzzle like that of *Scala;* below the oral orifice is an organ named by Lovèn the *mentum*, which is usually more or less medially grooved or fissured, and hence, at its anterior end, more or less bilobate, and extensile or retractile before or behind the front margin of the foot. The shell is turrited, with a plicate axis; the outer lip frequently internally lirate; in the larger forms the aperture is obscurely channelled in front; the larval shell is sinistral the adult dextral, the former frequently set at an angle to the adult axis, or more or less immersed in the adult apical whorls; it is usually helicoid and smooth; the sculpture varies from nothing to ribbed, spirally sulcate or reticulate; the coloration when present usually reddish, brownish or yellow. The eggs are numerous and deposited in a lenticular mass. The distribution is world-wide, but the larger forms are mostly tropical.

SYNOPSIS OF THE GENERA OF PYRAMIDELLIDÆ.

Pyramidella Lamarck.

Shell elongate-conic, whorls usually inflated and regularly increasing; the pillar with from one to three folds; the outer lip entire; the shell usually larger than in *Turbonilla.* Type, *Trochus dolabratus* Linné.

Turbonilla Risso.

Shell cylindro-conic, many whorled, generally slender; columellar fold single, varying in strength, outer lip entire; shell usually smaller

than in *Pyramidella* and larger than in *Odostomia*. Type, *Turbonilla typica* D. & B.=*Turbonilla plicatula* Risso not *Turbo plicatulus* Scacchi.

Odostomia Fleming.

Shell usually short, few whorled, subconic or ovate; columellar fold single, varying in strength, outer lip entire. Type, *Turbo plicata* Mont.

Murchisonella Mörch.

Shell minute, cylindro-conic; outer lip with an anal sinus behind the periphery of the whorl; pillar with the plait obsolete or internal, whorls numerous and inflated. Type, *Murchisonella spectrum* Mörch.

SYNOPSIS OF THE SUBGENERA OF PYRAMIDELLA.

A[1] Columellar folds three
Shell umbilicated
Basal fasciole absent, surface polished, marked by extremely faint lines of growth and microscopic spiral striations
Subg. **Pyramidella** Lamarck. s. s., 1799.
Type, *Trochus dolabratus* L.

Basal fasciole present, surface less polished than in *Pyramidella* s. s., marked by lines of growth and microscopic spiral striations
Milda subg. nov.
Type, *Obeliscus ventricosus* Quoy.

Shell not umbilicated.
Surface polished, marked only by fine lines of growth and microscopic spiral striations
Periphery sulcate
Subg. **Longchæus** Mörch, 1875.
Type, *Pyramidella punctata* Chem.

Periphery not sulcate
Voluspa subg. nov.
Type, *Pyramidella auricoma* Dall.

Surface sculptured
Basal cords absent
Periphery sulcate
Shell marked by strong axial ribs which terminate at the periphery, and microscopic spiral striations
Subg. **Pharcidella** Dall, 1889.
Type, *Pharcidella folinii* Dall.

Shell marked by strong spiral keels and weak axial riblets

Callolongchæus subg. nov.

Type, *Pyramidella jamaicensis* Dall.

Periphery not sulcate

Shell marked by strong axial ribs, intercostal spaces strongly spirally striated, aperture auricular

Subg. **Otopleura** Fischer, 1885.

Type, *Pyramidella auris-cati* Chem.

Basal cords present

Shell marked by strong spiral ridges, moderately strong axial ribs and two basal cords

Subg. **Triptychus** Mörch, 1875.

Type, *Triptychus niveus* Mörch.

A² Columellar folds two

Shell umbilicated

Surface polished, marked by very fine lines of growth and microscopic spiral striations

Subg. **Tiberia** Monterosato, 1875.

Type, *Pyramidella nitidula* A. Ads.

Surface polished, marked by fine lines of growth and strong spiral striations

Ulfa subg. nov.

Type, *Pyramidella* (*Ulfa*) *cossmanni* nom. nov. = *Syrnola striata* Cossmann.

Surface marked by strong axial ribs, intercostal spaces spirally pitted; early post-nuclear whorls sculptured differently from the later ones

Tropæas subg. nov.

Type, *Pyramidella subulata* A. Ads.

Shell not umbilicated

Surface polished, marked by very faint lines of growth and microscopic spiral striations

Basal fasciole present

Vagna subg. nov.

Type, *Pyramidella paumotensis* Tryon.

Basal fasciole absent

Subg. **Eulimella** Forbes, 1846.

Type, *Eulimella crassula* Fbs., =*E. scillæ* Scacchi.

Aperture subquadrate
Sect. **Eulimella** Fbs, ss.
Aperture suboval
Cossmannica sect. nov.
Type, *Pyramidella clandestina* Desh.

A[3] Columellar fold one
Shell umbilicated
Surface polished, or with fine lines of growth and microscopic spiral striations
Peripheral sulcus absent
Subg. **Orinella** nom. nov.
Type, *Orina pinguicula* A. Ads.

Peripheral sulcus present
Sulcorinella subg. nov.
Type, *Pyramidella* (*Sulcorinella*) *dodona*, sp. nov.

Shell not umbilicated
Large, heavy, elongated shells
Surface spirally lirate
Subg. **Actæopyramis** Fischer, 1885.
Type, *Monoptygma striata* Gray.

Slender, medium sized shells
Surface polished, marked by fine lines of growth and microscopic spiral striations
Postnuclear whorls increasing slowly in size at first, then rapidly, lending the shell a mucronate appearance
Subg. **Styloptygma** A. Adams, 1860.
Type, *Monoptygma stylina* A. Ads.

Postnuclear whorls increasing regularly in size
Subg. **Syrnola** A. Adams, 1860.
Type, *Syrnola gracillima* A. Ads.

Aperture suboval
Sect. **Syrnola** A. Adams, s. s.

Aperture subquadrate
Sect. **Stylopsis** A. Adams, 1860.
Type, *Stylopsis typica* A. Ads.
Surface spirally striated
Iphiana subg. nov.
Type, *Syrnola densistriata* Garrett.

Surface axially and spirally striated with a strong spiral keel at the summit of the whorls
Syrnolina subg. nov.
Type, *Syrnola rubra* Pse.

The status of *Agatha virgo* A. Adams 1860, [*Menestho*, 1861, *Myonia*, 1861, *Amathis* 1861], is not known to us. From the meager description we are inclined to believe that it is allied to *Actæopyramis* Fischer.

SYNOPSIS OF THE SUBGENERA OF TURBONILLA.

A[1] Shell without basal keel

B[1] Varices absent

Spiral sculpture absent, or if present consisting of microscopic striations only

Surface of the early post-nuclear whorls marked by feeble axial ribs, later ones smooth

Subg. **Ptycheulimella** Sacco, 1892.

Type, *Pyramidella pyramidata* Desh.

Surface marked by strong axial ribs which terminate at the periphery of the whorls, intercostal spaces excavated between the sutures.

Subg. **Chemnitzia** Orbigny, 1839.

Type, *Melania campanella* Phil.

Surface marked by strong axial ribs and intercostal spaces which extend over the periphery to the umbilical region

Subg. **Turbonilla** Risso, 1826.

Type, *Turbonilla* { *typica* D. & B.= *plicatula* Risso.

Spiral sculpture present, always stronger than microscopic striations

C[1] Axial sculpture consisting of well developed ribs

Spiral markings consisting of many very fine spiral striations

Aperture subquadrate

Subg. **Strioturbonilla** Sacco, 1892.

Type, *Strioturbonilla alpina* Sacco.

Aperture suboval

Subg. **Pyrgolampros** Sacco, 1892.

Type, *Pyrgolampros mioperplicatulus* Sacco.

Spiral marking absent between the sutures, base strongly spirally lirate

Subg. **Sulcoturbonilla** Sacco, 1892.

Type, *Tornatella turricula* Eichw.

Spiral markings consisting of strong striations
Summits of the whorls strongly shouldered
Subg. **Pyrgisculus** Monterosato, 1884.
Type, *Melania scalaris* Phil.

Summits of the whorls not strongly shouldered
Subg. **Pyrgiscus** Philippi, 1841.
Type, *Melania rufa* Phil.

Spiral markings consisting of one or two strong punctate cords in the intercostal spaces between the sutures; whorls slightly shouldered
Subg. **Pyrgolidium** Monterosato, 1884.
Type, *Pyrgolidium roseum* Mont.

Spiral markings consisting of one or two strong cords; whorls somewhat overhanging
Subg. **Tragula** Monterosato, 1884.
Type, *Odostomia fenestrata* Fbs.

Spiral markings consisting of three to six raised threads between the sutures and lirations on the base; whorls strongly shouldered
Subg. **Dunkeria** Carpenter, 1857.
Type, *Dunkeria paucilirata* Cpr.

C[2] Axial sculpture consisting of faint riblets
Spiral markings consisting of strong raised threads
Subg. **Cingulina** A. Adams, 1860.
Type, *Cingulina circinata* A. Ads.

Spiral sculpture consisting of depressed lirations, sculpture granulose
Subg. **Saccoina** nom. nov.
Type, *Spica monterosatoi* Sacco.

C[3] Axial sculpture consisting of lines of growth only
Spiral markings consisting of many subequally spaced striations; sculpture finely reticulated
Subg. **Careliopsis** Mörch, 1874.
Type, *Monoptygma* (*Careliopsis*) *styliformis* Mörch.

C[4] Axial sculpture absent
Spiral markings consisting of a broad strong fold at the summit of the whorls, separated from the rest of the whorl by a deep, broad, rounded sulcus
Visma subg. nov.
Type, *Eulimella tenuis* Sby.

B[2] Varices present
Surface marked by axial ribs and strong spiral striations
Subg. **Mormula** A. Adams, 1861.
Type, *Mormula rissoina* A. Ads.

Surface marked by axial ribs and strong spiral lirations, sculpture granulose
Subg. **Lancella** nom. nov.
Type, *Turbonilla* (*Lancea*) *elongata* Pse.

A[2] Shell with basal keel
Axial sculpture consisting of strong ribs
Spiral sculpture absent
Asmunda subg. nov.
Type. *Chemnitzia turrita* C. B. Ads.

Spiral sculpture present
Spiral sculpture consisting of strong ridges
Subg. **Peristichia** Dall, 1889.
Type, *Peristichia toreta* Dall.

Spiral sculpture consisting of two tumid ridges one at the periphery the other at the summit of the whorls and many fine striations in the intercostal spaces
Baldra subg. nov.
Type. *Turbonilla* (*Baldra*) *archeri* sp. nov.

Axial sculpture consisting of lines of growth only
Spiral sculpture consisting of faint lirations
Discobasis Cossmann, 1888.
Type, *Acieulina demissa* Desh.

SYNOPSIS OF THE SUBGENERA OF ODOSTOMIA.

A[1] Postnuclear whorls sculptured similarly throughout
B[1] Varices absent
C[1] Axial ribs present, rounded
Spiral markings, when present, consisting of mere microscopic striations
Shell inflated
Summit of the whorls slightly shouldered
Subg. **Elodiamea** De Folin, 1884.
Type, *Elodia elegans* De Fol.

Shell not inflated

Summit of the whorls not shouldered

Subg. **Odostomiella** Bucquoy, Dautzenberg and Dollfus, 1883.

Type, *Rissoa doliolum* Phil.

Summit of the whorls tabulated

Subg. **Salassia** De Folin, 1885.

Type, *Salassia carinata* De Fol.

Spiral markings consisting of a strong, broad, raised cord at the summit of the whorls, separated from the remaining part by a strongly impressed spiral groove

Vilia subg. nov.

Type, *Odostomia* (*Vilia*) *gilsbryi* sp. nov.

Spiral markings consisting of two tumid ridges, one at the periphery and one at the summit of the whorls; with many striations on the base

Folinella subg. nov.

Type, *Amoura angulifera* De Fol.

Spiral markings consisting of several to many raised threads in the intercostal spaces, always less strongly developed than the axial ribs

Intercostal spaces crossed by equally spaced, raised spiral threads, sculpture reticulated

Subg. **Trabecula** Monterosato 1884.

Type, *Odostomia jeffreysiana* Monter.

Intercostal spaces crossed by several raised spiral threads, base not spirally marked

Subg. **Parthenina** Bucquoy, Dautzenberg and Dollfus, 1883.

Type, *Turbo interstinctus* Montagu.

Intercostal spaces crossed by several spiral threads, base spirally striated

Besla subg. nov.

Type, *Chrysallida convexa* Cpr.

Spiral markings consisting of strong, raised threads or cords, equal to, or even stronger than axial ribs

Spiral cords equally spaced, and equally well developed between the sutures and on the base; sculpture nodulose throughout

Subg. **Mumiola** A. Adams, 1864.

Type, *Monoptygma spirata* A. Ads.

Spiral cords subequally spaced between the sutures, where the sculpture is nodulose; base spirally lirate and axially striated

Subg. **Chrysallida** Carpenter, 1856.

Type, *Chemnitzia communis* C. B. Ads.

Spiral markings consisting of impressed lines

Spiral striations subequally spaced, present between the sutures and on the base of the whorls

Subg. **Pyrgulina** A. Adams, 1864.

Type, *Chrysallida casta* A. Ads.

Spiral striations on the base only, periphery deeply sulcated, axial ribs extending to the umbilical region

Egila subg. nov.

Type, *Chrysallida lacunata* Cpr.

Spiral striations on the base only, axial ribs terminating at the periphery, which is not sulcated

Subg. **Spiralinella** Chaster, 1901.

Type, *Turbo spiralis* Montagu.

C^2 Axial ribs present, lamellar

Spiral markings lamellar

Ribs and spiral lamellæ moderately strong, subequally spaced between the sutures and on the base; sculpture cuspidate

Haldra subg. nov.

Type, *Chrysallida photis* Cpr.

Ribs and spiral lamellæ few, very strong

Ividia subg. nov.

Type, *Parthenia armata* Cpr.

C^3 Axial ribs present but very feeble, usually only indicated near the summit of the whorls

Spiral markings consisting of several strong, broad, tumid cords, one or more of the posterior cords crenulated

Subg. **Miralda** A. Adams, 1864.

Type, *Parthenia diadema* A. Ads.

Spiral markings consisting of many subequally spaced liræ

Whorls tabulated at the summit

Subg. **Ivara** Dall and Bartsch, 1903.

Type, *Odostomia* (*Ivara*) *turricula* D. & B.

Whorls not tabulated

Evalina subg. nov.

Type, *Odostomia* (*Evalina*) *americana* sp. nov.

C⁴ Axial ribs usually reduced to mere lirations, frequently only present between the spiral ridges

Spiral markings consisting of moderately well developed cords usually equally spaced and present between the sutures and on the base; axial ribs indicated by faint threads between the spiral sculpture

Shell umbilicated

Subg. **Iolæa** A. Adams, 1867.

Type, *Iole scitula* A. Ads.

Shell not umbilicated

Subg. **Menestho** Möller, 1842.

Type, *Turbo albulus* Fabr.

Spiral markings consisting of strongly raised lamellæ; axial ribs indicated by raised threads

Subg. **Odetta** De Folin, 1870.

Type, *Odostomia* (*Odetta*) *callipyrga* nom. nov. = *Odetta elegans* De Fol.

C⁵ Axial ribs absent; axial sculpture represented by lines of growth only

Spiral markings consisting of many, usually subequally and universally distributed impressed lines

Shell elongate-conic

Subg. **Evalea** A. Adams, 1860.

Type, *Evalea elegans* A. Ads.

Shell short, subglobose

Subg. **Oda** Monterosato, 1901.

Type, *Odostomia dolioliformis* Jeffr.

C⁶ Axial sculpture absent, shell polished

Spiral markings consisting of two tumid ridges, one at the periphery and the other at the summit of the whorls

Subg. **Cyclodostomia** Sacco, 1892.

Type, *Cyclodostomia mutinensis* Sacco.

Spiral markings consisting of a more or less conspicuous tumid ridge on the summit of the whorls

Subg. **Doliella** Monterosato, 1880.

Type, *Odostomia nitens* Jeffr.

Spiral markings consisting of a strong peripheral keel
Subg. **Scalenostoma** Deshayes, 1863.
Type, *Scalenostoma carinata* Desh.

Spiral markings consisting of a peripheral sulcus
Subg. **Jordaniella** Chaster, 1898.
Type, *Turbo nivosa* Montagu.

Spiral sculpture absent or indicated only by extremely fine microscopic lines of growth or striæ; surface polished
Summits of the whorls with a strongly tabulated shoulder
Subg. **Spiroclimax** Mörch, 1874.
Type, *Spiroclimax scalaris* Mörch.

Summits of the whorls not tabulated
Columellar fold present
Peritreme discontinuous, aperture not rissoid
Shell inflated, very large
Subg. **Amaura** Möller, 1842.
Type, *Amaura candida* Möller.

Shell not inflated
Subg. **Odostomia** Fleming, 1817.
Shell of medium size
Sect. **Odostomia** Fleming, s. s.
Type, *Turbo plicata* Mont.

Shell rather large
Sect. **Stomega** nom. nov.
Type, *Odostomia conspicua* Ald.

Shell small
Sect. **Brachystomia** Monterosato, 1884.
Type, *Odostomia rissoidea* Hanl.

Peritreme continuous, aperture rissoid
Heida subg. nov.
Type, *Syrnola caloosaensis* Dall.

Columellar fold obsolete
Shell umbilicated
Subg. **Myxa** Hedley, 1903.
Type, *Myxa exesa* Hedley.

Shell not umbilicated
Peritreme continuous, aperture rissoid
Subg. **Pseudorissoina** Tate and May, 1900.
Type, *Stilifer tasmanica* Ten-Wood.

Peritreme not continuous, aperture not rissoid

Subg. **Liostomia** O. Sars., 1878.

Type, *Rissoella? eburnea* Stimpson.

B^2 Varices present

Shell smooth, axial sculpture indicated by a few varices, spiral sculpture wanting

Subg. **Oceanida** De Folin, 1870.

Type, *Oceanida gradata* De Fol.

A^2 Early postnuclear whorls sculptured differently from the later ones

Early post nuclear whorls loosely coiled, plain; later ones closely coiled with a spiral keel at the periphery and one at the summit of the whorls; base spirally lirate

Lysacme subg. nov.

Type, *Chrysallida clausiliformis* Cpr.

Early post nuclear whorls axially ribbed, succeeded by one or two strongly spirally and faintly axially lirate whorls; the rest of the whorls are marked by a reticulated sculpture consisting of raised axial and spiral cords

Subg. **Obtortio** Hedley, 1899.

Type, *Rissoa pyrrhacme* Melville and Standen, 1899.

DESCRIPTIONS OF NEW SPECIES THAT ARE TYPES OF SUBGENERA DEFINED IN FOREGOING SYNOPSIS.

Pyramidella (**Sulcorinella**) **dodona** sp. nov.

Shell small, elongate-conic, milk-white. Nuclear whorls one and one-half, smooth, obliquely immersed in the first postnuclear whorl. Postnuclear whorls flattened, moderately shouldered at the summit, having a strong spiral sulcus at the periphery. Base of the last whorl well rounded and strongly umbilicated. The summits of the whorls fall a little anterior to the peripheral sulcus of the preceding whorl and cause the part of this, exposed between the sulcus and the summit of the next whorl, to appear as a narrow raised spiral band. Entire surface of the shell crossed by many axial lines of growth and numerous subequally and closely spaced spiral striations. Sutures subchannelled. Aperture ovate, posterior angle obtuse, outer lip thin, columella somewhat curved and reflected having a strong oblique fold a little anterior to its insertion; parietal wall covered by a thin callus.

The type, number 136,023 U. S. National Museum collection, is a fossil, coming from the Oligocene deposit at Oak Grove, Sta. Rosa Co., Florida. It has six and one-half postnuclear whorls which measure: long., 3.1 mm.; diam., 1.4 mm.

Turbonilla (Baldra) archeri sp. nov.

Shell small, elongate-conic, turriculated, milk-white. Nuclear whorls two and one-half, helicoid, about one-fourth immersed in the first postnuclear whorl, having their axis at a right angle to the axis of the later whorls. Postnuclear whorls moderately well rounded, having cuspidated tabulated shoulders and a spiral ridge at the summit and the periphery. Axial ribs prominent, narrow, flexuose, about one-third as wide as the intercostal spaces, sixteen occur upon the first, eighteen upon the fourth and the penultimate whorls. Intercostal spaces decidedly depressed between the spiral ridges, crossed by many subequally spaced microscopic spiral striations. Suture channelled. Periphery of the last whorl angulated, rendered somewhat crenulated by the axial ribs which extend feebly over the base to the umbilical region. A broad, depressed tumid ridge extends across the anterior half of the base, and the space between the posterior termination of this ridge and the peripheral ridge appears somewhat concave. Entire base finely and closely spirally striated. Aperture suboval, posterior angle obtuse, outer lip thin, angulated at the shoulder and periphery; columella straight, slightly reflected; columellar fold obsolete or internal; parietal wall covered by a thin callus.

The type and another specimen are registered as number 58,016 in the collection of the Academy of Natural Sciences, Philadelphia. They were collected by S. Archer, at Singapore. The type has seven postnuclear whorls and measures: long., 3.3 mm.; diam., 1.3 mm.

Odostomia (Vilia) pilsbryi sp. nov.

Shell slender, milk white. Nuclear whorls two and one half, helicoid, a little more than one-third immersed in the first postnuclear whorl, having their axis almost at a right angle to the axis of the later whorls. Postnuclear whorls flattened, or even slightly concave in the middle, between the sutures; contracted near the summit, the posterior portion appearing as a strong, rounded, spiral keel, separated from the rest of the whorl by a spiral groove. Axial ribs prominent, scarcely indicated on the spiral keel but beginning strong at the groove in front of the keel and extending to the umbilical region, gradually diminishing in strength from the periphery to the anterior termination. These ribs are broadest and strongest at this posterior boundary, just anterior to the groove and lend the shell a coronated appearance at this place. About sixteen of them appear on the second and twenty upon the penultimate whorl. Periphery and base well rounded. Sutures well impressed.

Aperture subovate, outer lip [fractured], showing five internal, spiral lirations the middle one of which is stronger than the rest; columella short, twisted and revolute, having a strong oblique fold near its insertion.

The type is number 58,015 of the collection of the Academy of Natural Sciences of Philadelphia and was collected by S. Archer at Singapore. It has six and one half postnuclear whorls and measures: long., 2.7 mm.; diam., 1.1 mm.

Odostomia (Evalina) americana sp. nov.

Shell elongate-conic, subdiaphanous to milk-white. Nuclear whorls quite large, at least two, about three-fourths obliquely immersed. Postnuclear whorls rather broad between the sutures, well rounded, faintly shouldered at the summit, ornamented with depressed, rounded, rather broad axial ribs about eighteen of which occur upon the second, twenty on the third and eighteen upon the penultimate whorl. The ribs are best developed near the summits of the whorls and scarcely extend to the periphery. Spiral lirations low, rounded, subequal, about twelve occur between the sutures upon the third and the penultimate whorls. These spiral lirations like the axial ribs appear strongest near the summits of the whorls. Periphery and base of the last whorl well rounded, the latter ornamented by about eleven lirations which are similar in character to those between the sutures but much less strongly expressed. Aperture rather broad, suboval, somewhat effuse anteriorly, posterior angle acute; outer lip thin; columella short, somewhat curved, strongly revolute anteriorly, having a weak oblique fold near its insertion.

The type, No. 168,718 U. S. National Museum collection, and nine specimens come from San Pedro, California. It has five postnuclear whorls and measures: long., 2.9 mm.; diam., 1.3 mm. Another specimen, 168,719, comes from San Diego, and two others, No. 168,720, from Sta. Catalina Id., California. Ten were determined for Mrs. Oldroyd from San Pedro.

VOL. XVII, PP. 17-20 FEBRUARY 5, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW LIZARD FROM THE RIO GRANDE VALLEY, TEXAS.

BY LEONHARD STEJNEGER.

[By permission of the Secretary of the Smithsonian Institution.]

During the various collecting trips made by the field naturalists of the Biological Survey into western Texas, a series of lizards belonging to the genus *Sceloporus* were collected, which clearly belong to an undescribed species. It forms part of the small section of the genus characterized by the minuteness of the lateral scales, of which, thus far, only two species have been taken within the United States, viz., *S. variabilis* and *S. couchii*. I wish to associate with this very distinct species the name of the originator and chief of the Biological Survey, who has done such an immense work in increasing our knowledge of our vertebrate fauna.

Sceloporus merriami sp. nov.

Diagnosis.—Lateral scales minute, granular; 55 to 56 femoral pores in a continuous series across the preanal region; 56 to 66 scales between the shielded part of the head and the base of the tail; 14 to 18 dorsal scales corresponding to the shielded part of the head; head shields smooth.

Habitat.—Rio Grande Valley, western Texas.

Type.—United States National Museum, No. 33,039; East Painted Cave,

near mouth of Pecos River, Texas, September 2, 1890; W. Lloyd, collector, U. S. Biological Survey.

Description.—Type: Adult male. Head-shields smooth; two canthal scales, between the posterior of which three larger prefrontal shields across the snout; frontal shield divided transversely; posterior frontal separated from interparietal and parietals by two pentagonal frontoparietals which are broadly in contact; interparietal larger than the two parietals together, trapezoid, the width anteriorly somewhat less than posteriorly, the length equalling the greatestwidth; five large transverse supraorbitals separated from the frontals and parietals by a single series of small scales, and from the superciliaries by a double series; six supralabials, separated from the nasal and from the long subocular by a single series of scales, fourth supralabial under the center of the eye; about five elongate pointed scales at anterior border of ear-opening; dorsal scales small, though nearly twice as large as the ventrals, rounded behind, keeled, forming nearly parallel longitudinal lines; 61 scales along the middle line of the back from the shielded part of the head to the base of the tail; 14 scales in the middle of the back corresponding to the shielded part of the head; lateral scales, including a broad area above the foreleg, minute, granular, in strong contrast to the dorsal and ventral scales; ventral scales smaller than dorsals, smooth, often deeply nicked; scales on throat as large as ventrals, those across the lower neck even larger, more pointed and with the terminal portion more free; sides of neck with strong longitudinal folds joining posteriorly an oblique fold in front of the shoulder, which meets the one of the other side across the lower neck; about 114 scales (and lateral granules) round the middle of the body; adpressed fore limb reaches the groin; adpressed hind limb reaches the center of the eye; tibia a trifle shorter than distance from tip of snout to ear-opening; scales covering upper side of limbs larger than the dorsals, especially those on tibia, each with strong keel ending in a point; 51 femoral pores in a nearly continuous line across the preanal region, only one scale interrupting the series on the middle line; tail covered with keeled scales larger than dorsals, sharply mucronate; well-developed postanal plates.

Color (in alcohol) above, very pale clay color with ill-defined obscure dusky spots on the median portion of the back, and numerous, closely set, whitish dots which are most plainly seen above the insertion of the foreleg; a vertical, narrow, bluish-black line, bordered posteriorly with white, in front of the insertion of the foreleg; underside, white; the throat with indistinct, pale bluish-gray lines and a somewhat ill-defined, large, bluish-black, horseshoe-shaped spot on the lower neck; sides of belly pale blue, with a broad crescentic inner edge of bluish-black leaving only about four scale rows on the middle line of the belly white.

Dimensions.—Total length, 130 mm; tip of snout to vent, 55; tip of snout to ear, 13; width of head, 11; fore leg, 28; hind leg, 42.

Variation.—The scutellation is fairly constant in the series of eight specimens examined by me. The head shields show some variation in the size and number of those covering the snout, but otherwise they are sur-

prisingly uniform, especially the three large prefrontals, the frontals, fronto-parietals and interparietals. In one specimen, No. 33,040, the anterior frontal is semi-divided longitudinally, and in a few there is an extra fronto-parietal due to the division of the fronto-parietal or the separation of the anterior portion of the parietal. The fold across the fore neck is very variable, mostly absent or merely indicated. The variation of proportion and size of scales, femoral pores, etc., will be seen from the subjoined table, but it should be remarked that the great diversity in the scales round the middle of the body is probably due to the difficulty in exactly counting the lateral granules.

The males have well-developed postanal scutes which are lacking in the females.

The variation in color is chiefly confined to the degree of distinctness of the dusky markings above. Thus, No. 33,035 has several series of blackish dorsal spots edged behind with smaller whitish spots; leg, (including digits) and tail, are cross-barred with dusky; there is also a well-marked dusky vertical line from eye to edge of lip and a less distinct line between eye and ear. From this specimen there is a complete gradation to the nearly uniform color of the type. There are no indications of longitudinal pale bands on the back, or of any dark band on the sides.

The females lack the blue, black-edged side patch underneath, and also the horseshoe mark on the fore neck; but there are faint bluish marblings on the throat, and the vertical blackish mark in front of the shoulder is indicated.

Habitat.—Thus far only found in the Rio Grande Valley from the mouth of Pecos River to Boquillas. This species, therefore, seems restricted to the Rio Grande Cañon.

Remarks.—This exceedingly distinct species needs no detailed comparison with other species of this difficult genus. By its continuous line of femoral pores across the preanal region it recalls *Sceloporus scalaris*, but the latter has large lateral scales and is also otherwise very different. The species to which this novelty is most nearly related is prob- *Sceloporus couchii*, in which the femoral pores, however, are restricted to the thighs, but the relationship is not near enough to make any further comparison necessary,

It will be noted that the type is described as having a distinct cross-fold under the neck, which is the character attributed by Cope to his genus *Lysoptychus*, based on a single specimen, from southern Texas. This character is absolutely valueless, as it is absent in most of the specimens, and there is nothing else to separate them from the genus *Sceloporus*. As a matter of fact Cope's *Lysoptychus lateralis* is nothing but a specimen of *Sceloporus couchii*, with the types of which I have carefully compared it. I may here correct a mistake in the original description of the latter (Proc. Phila. Acad., 1858, p. 254), in which the number of femoral pores is given as 25. In none of the type specimens (8) is there more than 19 pores on one side. The number varies in the lot between 15-15 and 18-19.

SPECIMENS OF SCELOPORUS MERRIAMI EXAMINED.

U. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Snout to vent.	Shield part of head.	Snout to ear-opening.	Tibia	Fourth toe from base of fifth.	Scales, occip. to tail.	Scales in head-length.	Scales round middle.	Femoral pores.
33,033	♂ ad.	Comstock, Texas.	July 26, 1902	M. Cary.	53	11.5	12.5	13	17	66	18	108	28-28
33,034	♀ ad.	Boquillas, Texas.	May 28, 1901	V. Bailey.	45	10	11	12	14	56	15	106	26-
33,035	♂ a l.	Mouth Pecos R , Tex.	Aug. 3, 1902	M. Cary.	52.5	11	12	13	16	61	16	120	25-25
33,036	.....	E. Painted Cave, Tex.	Sept. 1890	W. Lloyd.	.....	10	10.5	...	.....	.....	.....	.....	.....
33,037	♂ ad.	" " " "	Sept. 1, 1890	"	55	12	13	13.5	16.5	60	17	107	26-27
33,038	♂ ad.	" " " "	Sept. 3, 1890	"	49	11	11.5	12.5	17.5	60	16	106	26-27
33,039*	♂ ad.	" " " "	Sept. 2, 1890	"	55	12	13	13.5	17	61	14	114	25-26
33,040	♀ ad.	" " " "	Sept. 2, 1890	"	49.5	11	11.5	11.5	16	65	17	115	26-26

*Type.

Vol. XVII, pp. 21-50 March 10, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A REVISION OF THE NORTH AMERICAN MAINLAND SPECIES OF MYIARCHUS.

BY E. W. NELSON.

The present paper covers all of the species and subspecies of *Myiarchus* known to occur on the mainland of North America north of the Isthmus of Panama. In addition I have included the birds of Cozumel Island near the coast of Yucatan, and the Tres Marias Islands off the coast of Tepic, western Mexico.

The recently accumulated material in this group, especially the Mexican series in the Biological Survey collection, serves to throw much light upon the characters, relationships and distribution of several obscurely known species. In addition to the large series of specimens available in the Biological Survey and National Museum collections, Mr. William Brewster and Mr. Outram Bangs have kindly sent me material from their collections that has been of great value in filling gaps and enabling me to reach definite conclusions in some otherwise obscure questions.

The genus *Myiarchus* appears to reach its greatest development in the American tropics, including the West Indies, with a limited number of forms ranging well up into temperate North America. These most northerly representatives of the genus are *cinerascens* which reaches the northern border of the Upper Sonoran zone on the west coast in Oregon, and *crinitus*

which crosses the Transition zone of eastern America to southern Canada and New Brunswick. *M. lawrencei* and its subspecies is the most widely distributed of the North American species, with a breeding range extending from the Isthmus of Panama to southern Arizona and the Tres Marias Islands. The species of most limited distribution is probably *M. yucatanensis*, found only on the peninsula of Yucatan and on Cozumel Island.

The North American species of *Myiarchus* appear to have but one moult a year and this occurs immediately following the breeding season, from August to September or perhaps October. The birds are much darker or more richly colored for a short period following the assumption of the new plumage than at any other period. This extreme intensity of coloration quickly passes into a duller condition which continues with but little change through the winter months. In spring the colors gradually fade or become bleached by the sun until in the breeding season the original shades of greenish, olive and gray of the back and the yellow of the under parts are almost lost in the dingy browns and yellows of the frayed plumage. The upper parts especially bleach to a dingy grayish brown so nearly alike in several species that there is but little color difference between summer specimens, and identification of birds in this condition depends largely on size and tail pattern. This condition becomes most marked in species living under the brilliant sun of the Lower Sonoran and Arid Tropical regions and is much less noticeable in species like *cinitus* which live in regions of greater humidity and cloudiness.

The general resemblance in color between many of the subspecies and even between some of the species would render a description of faded spring or summer birds misleading in the apparent uniformity of coloration, while the most richly colored condition that is found immediately after the moult in late summer or fall is so evanescent that it can scarcely stand to represent the average characters. For this reason in the following descriptions I have taken, when available, the unworn winter birds which represent the typical colors of the various species from soon after the fall moult until the wear and fading of the spring and summer begin to destroy the distinctive shades of color. I have designated this as the 'fresh' plumage. In

some specimens the winter condition of the colors remains until late in spring or early summer, but ordinarily they are much faded at this season. The sexes are alike in color, but the females are usually smaller than the males, as shown by the measurements.

In most of the published descriptions of the rufous-tailed species described in the present paper, little or no range of variation in distribution of the dusky pattern on the tail feathers has been mentioned. This has given the erroneous impression that these markings are rather constant and has led to the identification of female individuals of *cinerascens* from Arizona as *nuttingi*. By the examination of several hundred specimens of the various species it has been demonstrated that the dusky pattern on the inner webs of the outer tail feathers (and to a similar degree on the inner tail feathers) of *cinerascens*, *mexicanus*, *crinitus*, and *nuttingi* with their subspecies have a wide range of variation in extent, though usually preserving a characteristic outline, although at times this also disappears. Thus we have the dusky area practically gone on the inner web of the outer tail feather of some of the females of *cinerascens*, producing a pattern exactly as in *nuttingi*. One specimen of otherwise typical *cinerascens* from Guanajuato has the dusky line along the shaft as in typical *inquietus*, and a specimen of *nuttingi* from Honduras has the dusky shaft line of *inquietus*. *M. crinitus* may or may not have a dusky shaft line on inner web, while in *mexicanus* this line varies greatly in width. The rufous border to inner webs of tail feathers in *yucatanensis* also varies much in width and may or may not be present on the outer feather. The considerable amount of individual variation thus shown renders it difficult to make a key that is serviceable in identifying more than average specimens of some species.

In the cases of *cinerascens* and *nuttingi* the differences in dimensions are decisive and almost equally diagonostic between these two and *inquietus*.

The first plumage of the young in all of the species is characterized by a much greater amount of rufous on the wings and tail than in the adult. This is especially marked on the tail, in which the characteristic dusky pattern of the adult is not apparent. The extension of the rufous on the tail usually includes

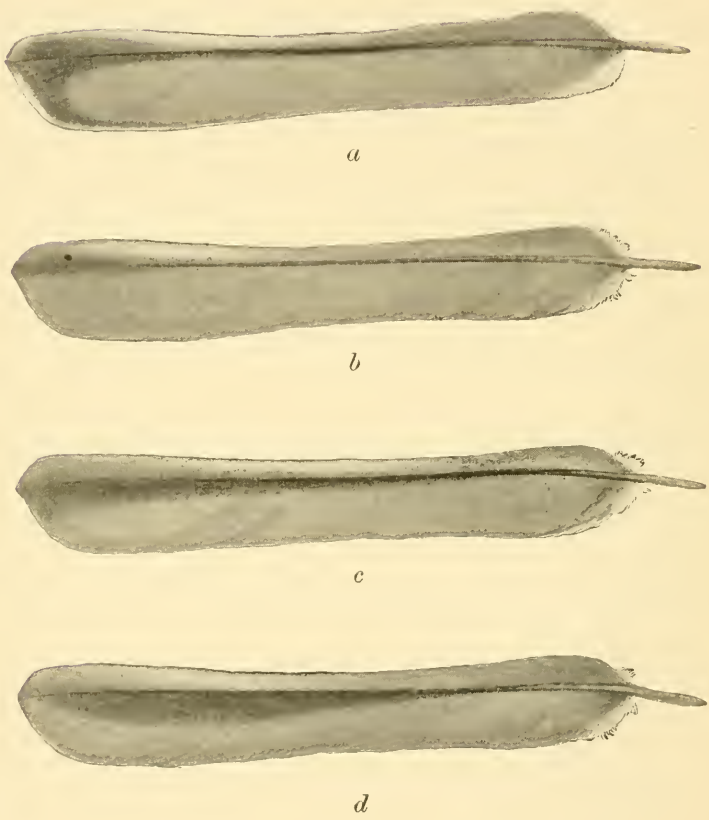

FIG. 1. Outer tail feathers of American Mainland *Myiarchus*.

a. Myiarchus cinerascens.
b. Myiarchus nuttingi.
c. Myiarchus n. inquietus.
d. Myiarchus mexicanus.

both middle and outer pair of feathers and effects a generalized pattern.

Even the young of *M. nigriceps* which is without rufous in the adult plumage has it strongly marked on the wings and tail of the young. Among the great number of winter specimens examined I have not found a single individual in this first plumage, so it appears that the young moult this plumage within a short time and assume the dress of the adult.

It is with some hesitation that I add further to the discussion concerning the application of Kaup's *Tyrannula mexicana* and *T. cooperi*, a matter which has already been the subject of much difference of opinion; but the case appears to be still unsettled, and my notes may help toward its definite determination.

In the Proceedings of the Zoological Society of London for 1851, p. 51, Kaup described two species of *Myiarchus* in such a brief and unsatisfactory manner that the application of his names has given rise to much controversy. From recent study of the matter it appears to me that Prof. Baird was right in his disposal of the names (Birds of North America, 1858, p. 180) and that their present use by American ornithologists is wrong. The matter cannot be absolutely settled until Kaup's types are examined, but the present evidence in support of Prof. Baird's conclusions are of interest. He recognized Kaup's error in applying Nuttall's *Muscicapa cooperi* (= *Tyrannula cooperi* Kaup, a synonym of *Nuttallornis borealis*), to a *Myiarchus*, and then proceeded to make a new use of the name (loc. cit.), describing in detail as *Myiarchus cooperi* a specimen from "Mexico" (No. 9100 U. S. National Museum). Baird's type is still in the Museum collection and is the bird from eastern Mexico and the Rio Grande Valley commonly known to ornithologists as *Myiarchus mexicanus mexicanus*. In case, as I believe, the latter name belongs elsewhere, then Baird's name *cooperi* becomes available for this species. Baird identified Kaup's *Tyrannula mexicana* as Lawrence's *Tyrannula cinerascens* (Ann. Lyc. Nat. Hist. N. Y., V., Sept. 1851, p. 121) and gave it priority over the latter name on the strength of the dates on which the two papers were read; Kaup's paper having been read on February 11, 1851 and Lawrence's in September, 1851. According to Sclater (P. Z. S., 1893, p. 439) the part of the Proceedings of the Zoological Society containing Kaup's

paper was not actually published until October 28, 1852, while the American Journal of Sciences and Arts, 2d Series, XIII, No. 38, p. 303 for March, 1852, contains a notice of Lawrence's paper, thus giving *cinerascens* at least six months priority. The reasons for believing that Kaup's *mexicana* is the same as *cinerascens* are as follows: Kaup states that the type of *T. mexicana* was sent from Mexico by Mr. Wollweber but mentions no definite locality. Mr. Wollweber sent various birds to the Darmstadt Museum in addition to the type of *mexicana*, among which were the types of *Pitangus derbianus* and *Parus wollweberi* both of which were recorded from Zacatecas. I have seen no other locality mentioned for any of Wollweber's specimens and it is not unreasonable to suppose the type of *mexicana* came from the same district. Zacatecas lies on the west side of the Mexican tableland remote from the range of the so-called *M. mexicanus mexicanus* of eastern Mexico, but within the range of *cinerascens* which is common in parts of this State. Furthermore Kaup, in his description of *T. cooperi*, says, "with shorter wings than *mexicanus* but with longer bill like *crinita*, throat and over breast light gray," and mentions the broad black stripe along inner web of outer tail feathers, all of which applies to the bird we now call *mexicanus*. In the description of *mexicana* he says, "breast light ash-gray; above lighter," which is certainly applicable to *cinerascens*. Measurements of a large series of the bird we now call *mexicanus* and of *cinerascens* show that a considerable percentage of males of *cinerascens* have longer wings than many of the specimens of "*mexicanus*" from eastern Mexico, while the differences between the size of bill and color mentioned by Kaup are exactly applicable to these two birds. It is true that Mr. Sclater compared Kaup's type of *mexicana* with certain specimens in the British Museum and found them to be similar and that they were the same as Baird's *M. cooperi* (fide Ridgway, Proc. Biol. Soc. Wash., II, pp. 90–91); but in the Biologia II, p. 91, Salvin and Godman, apparently with the same specimens before them which Sclater found to be similar to Kaup's type and pronounced to be the same as *M. cooperi* Baird, come to exactly the opposite conclusion and pronounce these specimens to represent *cinerascens*, and state that Baird's conclusions as given above regarding the application of Kaup's names were correct.

The authors of the Biologia however, in place of using Baird's name *cooperi* unite the birds of eastern and western Mexico under Ridgway's *magister*, which is a distinct subspecies from *cooperi* and should not be confused with either of Kaup's birds.

The color terms in this paper are based on Mr. Ridgway's 'Nomenclature,' and all measurements are given in millimeters.

I have again to thank Mr. Robert Ridgway and Dr. Chas. W. Richmond, of the National Museum, for their continued courtesies.

KEY TO SPECIES AND SUBSPECIES.

Bill rounded, with depth at angle of gonys nearly or quite equal to width at same place (subgenus *Myiarchus*)

Wing and tail feathers without rufous or cinnamon area on either web; crown olive brown; back greenish olive - *panamensis* p. 29.

Wing and tail feathers with distinct rufous or cinnamon area on one or both webs

Inner web of outer tail feather usually entirely rufous (except in some specimens a narrow dusky line along shaft mainly near tip)

Bill small and proportionately slender (exposed culmen usually less than 19 mm.)

Size small, wing usually less than 86 mm. - *nuttingi* p. 37.

Size larger, wing usually more than than 93 mm. (♀'s in part) *cinerascens* p. 33.

Bill stout and proportionally heavy (exposed culmen usually more than 19 mm.)

Underside of neck and breast pale ashy gray *brachyurus* p. 40.

Underside of neck and breast dark gray

Exposed culmen not over 20 mm. - - *crinitus* p. 29.

Exposed culmen over 20 mm. - - *residuus* p. 30.

Inner web of outer tail feather partly or wholly dusky

Inner web of outer tail feather wholly dusky *yucatanensis* p. 41.

Inner web of outer tail feather partly dusky

Inner web of outer tail feather with well defined dusky band along shaft, rufous along inner border to tip

Bill long and heavy (usually 20 mm. or over); dusky band on inner web of outer tail feather usually broadest in middle.

Size smaller, wing usually less than 105 mm. *mexicanus* p. 31.

Size larger, wing usually more than 105 mm. *magister* p. 33.

Bill small and slender, exposed culmen usually less than 18 mm.; dusky band on inner web of outer tail feather broadening gradually from base, widest at tip

Inner webs of tail feathers mainly rufous *inquietus* p. 38.
Inner web of tail feathers mainly dusky *yucatanensis* p. 41.
Inner web of outer tail feather usually entirely rufous on basal two-thirds, with outer third more or less broadly tipped with dusky
Bill smaller, slenderer; color darker - *cinerascens* p. 33.
Bill larger, broader: color paler - - *pertinax* p. 36.

Bill flattened with depth at angle of gonys decidedly less than width at same place (subgenus *Onychopterus*)
Tail feathers usually distinctly edged on one or both webs with rufous or cinnamon
Tail feathers distinctly edged on both webs with rufous or cinnamon
Crown conspicuously darker than back (black or blackish)
Crown sooty black - - - - *nigricapillus* p. 44.
Crown clove brown - - - - *lawrencei* p. 42.
Crown appreciably darker than back (usually between olive and sepia brown) - - - - *querulus* p. 47.
Tail feathers not at all or but slightly edged on inner webs with rufous or cinnamon
Back greenish or greenish olivaceous
Back greenish, crown intensely black - *bangsi* p. 45.
Back greenish olivaceous, crown bistre brown *platyrhynchus* p. 45.
Back grayish olivaceous or hair brown
Back grayish olivaceous; inner webs of tail feathers usually not edged with rufous - - *olivascens* p. 48.
Back hair brown; inner webs of tail feathers usually slightly edged with rufous - - - *tresmariæ* p. 49.
Tail feathers not edged on either web with rufous; no rufous edgings on wings; crown dull black - - - *nigriceps* p. 49.

DESCRIPTIONS OF SPECIES AND SUBSPECIES.

Genus **Myiarchus** Cabanis.

1845. *Myiarchus* Cabanis, in Tschudi, Fauna Peruana, Aves, 1845, p. 152. Type *Muscicapa ferox* Gmelin.

Typical *Myiarchus* is characterized by a rounded and proportionately deep bill; the depth at angle of the gonys nearly or quite equaling its width at the same place. It includes the majority of the species in this paper, viz., *M. ferox panamensis*, *M. crinitus*, *M. c. residuus*, *M. mexicanus*, *M. m. magister*, *M. cinerascens*, *M. c. pertinax*, *M. nuttingi*, *M. n. inquietus*, *M. brachyurus*, and *M. yucatanensis*.

Myiarchus ferox panamensis (Lawrence).

PANAMA FLYCATCHER.

1860. *Myiarchus panamensis* Lawrence, Ann. Lyc. Nat. Hist. N. Y. VII, p. 284. May, 1860.

Type locality.—Lion Hill, Panama. Type in American Museum of Natural History (Lawrence collection).

Breeding range.—From nearly or quite to the southern border of Costa Rica (specimens examined from David, Chiriqui) through Panama (including San Miguel Island) into northern Columbia at least to Santa Marta. Not migratory.

Zonal distribution.—Humid Tropical.

Subspecific characters.—Larger than *ferox;* upper parts paler, more greenish olive.

Description of fresh plumage.—Crown olive, usually a little darker than back but often the same color; back greenish olive; upper tail coverts vary from hair brown to broccoli brown; tail coverts and outer webs of tail feathers edged with drab or isabella color; outer web of outer tail feather hair brown or drab, distinctly paler than inner web; rest of tail feathers plain dusky, slightly paler at tip; wing coverts, edges of secondaries and tertials hair brown (palest on tertials) and commonly tinged with slight shade of greenish; chin, throat and breast, ash gray; abdomen and under tail coverts sulphur yellow.

Measurements.—Averages of seven adult males from Panama and Chiriqui: Wing, 93.1 (87-96); tail, 90.3 (85-93); culmen, 19.1 (18-20); tarsus, 23.4 (22.5-24.5).

Averages of five adult females from Panama and Chiriqui: Wing, 91 (89-93); tail, 89 (87-91); culmen, 19.4 (18-21); tarsus, 23.7 (23-24.5).

General Notes.—*Myiarchus ferox* was described from Cayenne, Guiana, and the few specimens at hand from that and adjacent sections of South America appear to show that it is smaller with a smaller bill than *panamensis*, and the upper parts browner and less greenish. Birds from Chiriqui average a little larger than those from Panama. The series in the Bangs Collection from San Miguel Island, Panama, are not distinguishable from mainland birds in the same condition of plumage. Like *M. nigriceps* the present species is South American and only enters the area included within the limits of this paper at the northern extremity of its range. It has no near relative in North America.

Myiarchus crinitus (Linnæus).

GREAT CRESTED FLYCATCHER.

1766. *Muscicapa crinita* Linnæus, Syst. Nat., I, 12th ed., p. 325. Based on the *Muscicapa cristata, ventre luteo* of Catesby, Car. I, p. 52, t. 52.

Type locality.—Catesby says "It breeds in Carolina and Virginia" and

gives no more definite type locality; but as in the case of most of Catesby's species the Carolina birds probably served for his description.

Breeding range.—Throughout eastern North America from New Brunswick and Manitoba south to northern Florida and to Bexar County, Texas.

Migrates through eastern and southern Mexico and Central America to Panama and the Santa Marta Mountains in Colombia.

Zonal distribution.—Upper and lower Austral and Transition (in breeding season).

Specific characters.—Size large; under side of neck and breast rather dark olive-gray; back distinctly *greenish* olive; inner web of outer tail feather mainly or entirely rufous.

Description of fresh plumage.—Top of head olive with a brownish shade; back greenish olive; upper tail coverts hair brown margined with tawny-ochraceous; wing coverts pale grayish drab, sometimes tinged with greenish yellow; tertials edged with dull grayish white, sometimes tinged with greenish yellow; basal part of outer web of all but outer primary edged with deep cinnamon rufous; outer webs of tail feathers thinly margined on basal half with tawny ochraceous; inner webs of tail feathers, except middle pair, mainly or entirely bright cinnamon-rufous (almost orange-rufous) with a more or less distinct but narrow line of dusky along shaft in the majority of specimens; chin, throat and breast olive gray; abdomen and under tail coverts clear bright yellow—between naples yellow and sulphur yellow of Ridgway.

Description of young in first plumage.—Crown dull olivaceous-sepia brown; back dingy greenish olive; upper tail coverts hair brown broadly bordered and tipped with russet-cinnamon; tail as in adult but with inner webs of middle pair of tail feathers mainly cinnamon-rufous; wing coverts light buffy cinnamon; primaries and secondaries narrowly edged with cinnamon-rufous; tertials bordered with dull yellowish white, slightly tinged with buffy cinnamon; chin, throat and breast french gray; abdomen and under tail coverts primrose yellow.

Myiarchus crinitus residuus Howe.

FLORIDA GREAT CRESTED FLYCATCHER.

1901. *Myiarchus crinitus residuus* Howe, Cont. N. Am. Orn., I, p. 30. May 21, 1902.

Type locality.—Ishtopoga Lake, Florida. Type No. 1233, adult male, Howe-Shattuck Collection.

Breeding range.—Peninsular part of Florida. Probably not migratory.

Zonal distribution.—Lower Austral.

Subspecific characters.—Wing averages a little shorter and bill much larger than in *M. crinitus.*

COMPARATIVE AVERAGE MEASUREMENTS OF MYIARCHUS CRINITUS AND M. CRINITUS RESIDUUS.

Name	Sex	No. of specs	Wing	Tail	Culmen	Tarsus
M. crinitus	♂	10	106.1 (103-112)	92.7 (89-97)	19.3 (18- 20)	21.7 (21-22)
" "	♀	10	98.7 (98-102)	86.9 (83-93)	19.1 (18- 20)	21.4 (21-22)
M. c. residuus	♂	5	102.4 101-105)	91.8 (90-93	21.3 (20.5-22.5)	21.7 (20-23)

General Notes.—As first pointed out by Mr. Bangs, the Great Crested Flycatchers of southern Florida are readily distinguished from birds occupying other parts of its range by the much greater size of their bills. This character appears so constant and is so marked that it seems to be worthy of recognition by name, although not accompanied by any other equally well marked differences. Unfortunately the birds from the Carolinas are most like those from New England, so that Mr. Bangs in his *Myiarchus crinitus boreus* (Auk, XV, p. 179, April, 1898) renamed the type form. The name afterwards given by Mr. Howe to the bird of southern Florida must therefore be recognized. The amount of variation in color of this species aside from that due to seasonal wear and fading is not great, though occasional specimens have a lighter or more yellowish green shade on the back. The main variation is in the tail markings. Only sixteen out of sixty-six specimens of true *M. crinitus* have the inner web of the outer tail feather entirely rufous. The other fifty specimens have a narrow dusky line along the inner side of the shaft, varying from a thin barely appreciable line to a well marked band covering one-fourth the width of the web. This dusky line on inside of shaft of outer tail feather is present in seven out of eight of the birds from southern Florida. There appears to be no geographic significance in this marking, as it occurs throughout the range of the species and also in both sexes.

Myiarchus mexicanus (Kaup)*

MEXICAN CRESTED FLYCATCHER.

1852. *Tyrannula mexicana* Kaup, Proc. Zool. Soc. London, 1851, p. 51. Published October 28, 1852.

Type locality.—"Mexico." Type sent to the Darmstadt Museum from

*As explained in the notes under *Myiarchus cinerascens* the name *mexicanus* is probably a synonym of *cinerascens* but is used here in conformity with present custom until the type can be examined.

In case *mexicanus* proves to be a synonym of *cinerascens* then *Myiarchus cooperi* Baird, Birds of N. Am., p. 180, 1858 (Type from "Mexico" Vereaux Collection, No. 9100 U. S. National Museum) becomes available for this species.

Mexico by Mr. Wollweber but no definite locality mentioned.

Breeding range.—From the Rio Grande Valley in southern Texas, south along the tropical and subtropical parts of eastern Mexico to Yucatan, Cozumel Island, Belize, northeastern Guatemala, and Honduras (Ceiba). Migratory only in northern part of its range.

Zonal distribution.—Lower Sonoran, Arid and Humid Tropical.

Specific characters.—Crown olive; back brownish olive; wings and tail (on both webs) strongly margined with rufous.

Description of fresh plumage.—Top of head olive with a greenish shade, feathers indistinctly streaked with darker centers; back dull brownish olive, slightly grayer than crown; back of neck slightly grayer than back, forming an indistinct collar; upper tail coverts dingy raw-umber brown, sometimes edged with dull rusty; wing coverts broadly edged with dull brownish white; tertials edged with white, tinged with pale greenish; primaries, except first, edged along middle with dark rufous; chin, throat and breast ashy gray, palest on chin; abdomen and under tail coverts deep primrose yellow sometimes slightly washed with gray (especially in Yucatan and Cozumel specimens); outer web of outer tail feather varying from plain drab to lighter more grayish brown; inner web of outer feather with a band of dusky along shaft from near base to tip, usually a little broader in middle where it occupies from one-fifth to over one-half the width of web; other tail feathers, except middle pair, similar, but dusky band decreasing toward middle of tail.

Measurements.—Averages of seventeen adult males from northeastern Mexico: Wing, 102.4 (98-106); tail, 95.4 (90-98); culmen, 21.3 (20-23); tarsus, 23.5 (22.5-25).

Averages of five adult females from northeastern Mexico: Wing, 95.7 (94-98); tail, 90 (88-91); culmen, 19.9 (19-21.5); tarsus, 22.4 (21-23).

General Notes.—In worn or faded plumage much of the greenish wash on upperparts is lost and the coloration closely resembles that of *magister*. Specimens from the State of Vera Cruz average larger than those from the Rio Grande while those from Yucatan and Cozumel Island are smaller than from any other part of their range. Cozumel birds are also slightly darker than those from elsewhere. This form reaches the borders of the tableland along river valleys but does not inhabit the tableland proper. Its range comes in contact with that of *magister* only through the low gap in the elevated continental area at the Isthmus of Tehuantepec. A large proportion of specimens have the dusky line along shaft on inner web of outer tail feather appreciably broadest in the middle and narrowing toward each end, but in some individuals it is nearly the same width most of its length and in a few cases becomes a little broader near the tip.

A typical specimen in the Bangs Collection taken by Mr. W. W. Brown, January 16, 1902, at Ceiba, Honduras, is the southernmost record of this species with which I am familiar. This was perhaps a winter straggler.

Myiarchus mexicanus magister Ridgway.

ARIZONA CRESTED FLYCATCHER.

1884. *Myiarchus mexicanus magister* Ridgway, Proc. Biol. Soc. Wash., II, p. 90.

Type locality.—Camp Lowell, near Tucson, Arizona. Type No. 86,005, adult male, U. S. National Museum.

Breeding range.— From northwestern Chihuahua and southern Arizona through western Mexico at least to the border of Chiapas. A partial winter migration of northern birds extends as far as Guatemala, but they are resident throughout a large part of their range.

Zonal distribution.—Lower Sonoran and Arid Tropical.

Subspecific characters.—Generally similar to and in some cases difficult to distinguish in coloration from pale or faded specimens of true *mexicanus*, but upper parts averaging grayer and less greenish; throat and breast slightly paler ashy, and abdomen a trifle clearer or brighter yellow; size averages decidely larger.

Description of first plumage.—Crown light seal brown; back dark hair brown; upper tail coverts, broad border to outer webs and most of the inner webs of tail feathers dull, dark cinnamon rufous; lesser wing coverts tipped and tertials edged with pale vinaceous-buff; greater wing coverts, secondaries and primaries broadly edged with dull rusty rufous, paler than on borders of tail feathers; chin, throat and breast pearl gray becoming darkest on breast; abdomen and under tail coverts pale primrose yellow.

Measurements.—Averages of twenty-three adult males: Wing, 108.9 (103-114); tail, 100.3 (93-106); culmen, 23.2 (22-25); tarsus, 25.4 (24.5-26).

Averages of fifteen adult females: Wing, 106.7 (100-110); tail, 98.1 (94-102); culmen, 23 (22-25); tarsus, 25.1 (24-26).

General Notes.—Size is the only character by which *magister* can be distinguished in a great majority of cases. Specimens from the type region in southern Arizona are considerably larger than those from the more southerly part of their range. Among the series from various sections of the range, the one from the Tres Marias Islands averages the smallest thus paralleling the relatively smaller size of the series of typical *mexicanus* from Cozumel Island, off the coast of Yucatan. The types of both "*cooperi*" and *magister*, are larger than average birds of the forms they represent.

Myiarchus cinerascens (Lawrence).

ASH-THROATED FLYCATCHER.

1851. *Tyrannula cinerascens* Lawrence, Ann. Lyc. Nat. Hist. N. Y., V, p. 121. September, 1851.

Type locality.—Western Texas.

Breeding range.—From the Dalles, Oregon, Cheyenne, Wyoming, and

central southern Texas south to northern Lower California, central Sonora and at least to Zacatecas on the southern part of the Mexican tableland.

Winter range.—Migrates over all of Lower California and the rest of Mexico (except the southeastern tropical parts) at least to Guatemala.

Zonal distribution.—Upper and lower Sonoran.

Specific characters.—Upper parts grayish brown; crown a little darker than back; inner webs of tail feathers mainly rufous but tipped more or less broadly with dusky on outer feather.

Description of fresh plumage.—Top of head grayish bistre brown, usually a little darker than back; back dark hair brown, becoming paler and grayer in worn plumage; back of neck sometimes paler or more ashy than back; upper tail coverts dark hair brown, sometimes edged slightly with raw umber or russet (never in worn specimens); wing coverts and tertials broadly, and secondaries narrowly edged with grayish white; primaries (except first) edged with rufous; primaries, secondaries, tertials and top of tail feathers clove brown, palest on tertials; underparts from chin over breast and wash over fore-part of abdomen pale cinereous gray, becoming whitish in faded plumage; abdomen and under tail coverts primrose yellow (becoming whitish in faded plumage); basal half or three-fourths of outer web of outer tail feather distinctly whitish, latter color replaced on distal end by dusky line bordering shaft and widening toward end of feather in proportion to extent of same color on inner web of feather; inner web of outer feather cinnamon rufous from base to middle of feather, the rufous replaced along shaft at varying distances beyond this to within one-fifth of length from tip by dusky line gradually broadening to include entire tip and sometimes extending back as narrow border some distance along inner side of feather; extent of dusky tip varies from narrow border to half an inch or more; tips of other tail feathers except middle pair with similar pattern but amount of dusky decreasing inward.

Female.—Dusky on inner web of outer tail feather not rarely restricted to narrow wedge shaped line along shaft on terminal part of feather much as in *M. nuttingi;* but such birds are readily distinguishable by their much greater size.

Young in first plumage (Pecos River, northwest of Comstock, Tex., August 1, 1902).—Top of head dull rusty brown; back dull hair brown; upper tail coverts and tail mainly light cinnamon rufous, including middle pair of feathers; outer web of outer feather paler, except tip; narrow dusky shaft lines on distal third of all tail feathers and broad dusky band along basal two-thirds of shaft except on middle pair; underparts pale ashy whitish to breast; abdomen and under tail coverts yellowish white.

Measurements.—Averages of ten adult males from western Texas: Wing, 101.5 (99-103); tail, 95.2 (93-98); culmen, 18.9 (17.5-20); tarsus, 23.7 (23-24).

Averages of ten adult females from western Texas: Wing, 94.7 (91-98); tail, 87.9 (82-93); culmen, 17.9 (16.5-19); tarsus, 22.7 (21-24).

General Notes.—In "The Auk" for October, 1892, p. 394, was recorded the supposed occurrence in Arizona of *Myiarchus nuttingi* based upon three specimens, all females, in the Biological Survey collection—one from Rillito Creek, near Tucson, one from Oracle, and another from Prescott. After a detailed study of the large series of *Myiarchus cinerascens* and its near relatives in the Biological Survey and National Museum collections, it has become evident that all the supposed specimens of *M. nuttingi* from the United States are really females of *cinerascens*. The error in identification arose from the previously unknown fact that a considerable percentage of the females of *cinerascens* have the dusky area restricted at the tips of the inner webs of the outer tail feathers, sometimes being almost entirely absent and thus producing the exact tail pattern of *nuttingi*.

Myiarchus nuttingi is a much smaller species than *cinerascens* and is represented in the National Museum collection by the type only. There are two specimens in the Biological Survey collection, one from Nenton, Guatemala, and one from Ocozucuautla, Chiapas, the latter probably the most northerly actual record for the species. The broad area lying between the breeding range of *M. cinerascens* and that of *M. nuttingi* is occupied as shown below by *M. nuttingi inquietus* (Salvin and Godman).

I have carefully measured a series of *M. cinerascens* from the type region in western Texas, another from southern Arizona, another from northern California and Oregon, and still another of winter migrants from southern Mexico and northern Guatemala and the averages show close uniformity in size throughout its range, The size, when comparison is made between specimens of the same sex, is so much greater in *cinerascens* that the species may be at once distinguished from *nuttingi* by this character alone.

The identification of specimens of *cinerascens* as *nuttingi* was due to the almost precise similarity of the patterns of color on the outer tail feathers between these specimens and the type of *nuttingi*. On examination of the series of *cinerascens* at hand I find that among 113 males there is not a single specimen that lacks a definite dusky tip to the outer tail feather, although sometimes reduced to a narrow dusky border. On the other hand among 60 specimens of females, 15 of them showed a marked reduction of the dusky at tip of inner web of outer tail feather and a corresponding extension of the rufous. Several of these, in addition to the three specimens cited from Arizona, have the dusky so reduced on this feather that the rufous covers practically all of the inner web to the tip as in *nuttingi*. These were taken on the Santa Cruz River west of the Patagonia Mountains, Arizona, at Owens lake, Inyo County, and Mountain Spring, San Diego County, California, Alpine, mouth of Nueces River and Boquillas, Texas. Others with the dusky much reduced and forming merely a slender wedge-shaped line next the vane on the terminal part of the feather were taken at Baird, California, Santa Cruz River, Arizona, and a winter specimen at Mazatlan, Sinaloa, Mexico. Every gradation is shown in this series between the pattern on the outer tail feather of typical *cinerascens* and

nuttingi but they are all females, typically *cinerascens* in size and general coloration, and occur sporadically practically throughout the range of the species. From the frequency of this variation of the females it appears that there is a tendency toward the extension of the rufous at the expense of the dusky tip of the outer tail feather among them which is not shared equally by the males. While this variation appears to have no geographical significance, yet it evidently, judging from the specimens examined, occurs most frequently in southern Arizona. All of the 105 males examined have the tip of the outer tail feather sufficiently typical to enable one to identify them by this character without trouble, although there is considerable variation in the extent of the dusky on the tip. In some cases the feather is entirely rufous on the inner web to within one-fifth of its length from the tip, where the dusky begins next the vane and broadens rapidly into a narrow band occupying the tip of the feather and sometimes extending down a little along the inner border. In other cases the dusky begins at varying distances along the shaft to within one-third of its length from the base and extends outward in a gradually widening line to occupy the terminal 5 to 15 millimeters of the feather and may or may not extend back along the inner edge of the feather sometimes nearly or quite halfway to the base. When the dusky extends back along the inner edge of the feather the outer end of the rufous on this vane forms a narrowing point on the middle of the web. In other specimens it is cut squarely off by the inward extension of the dusky near the end of the feather. This variation occurs throughout the range of the species.

Myiarchus nuttingi inquietus (Salvin and Godman) replaces *M. cinerascens* to the south in Mexico, and the material at hand appears to show that they are distinct species.

Myiarchus cinerascens pertinax (Baird).

CAPE ST. LUCAS FLYCATCHER.

1859. *Myiarchus pertinax* Baird, Proc. Acad. Nat. Sci. Phila., 1859, p. 303.

Type locality.—Cape St. Lucas, Lower California. Type No. 12,944, U. S. National Museum.

Breeding range.—Cape region of Lower Calfornia north at least to Pichilinque Bay. Not migratory.

Zonal distribution.—Arid Tropical and border of Lower Sonoran.

Subspecific characters.—Similar to *cinerascens* but grayer above and more whitish below; size smaller; bill larger.

Description of first plumage.—Crown warm sepia brown; back hair brown; upper tail coverts dull cinnamon rufous; middle pair of tail feathers strongly margined with same; outer webs of rest of tail feathers except outer one similarly margined; outer web of outer feather whitish

on basal half and becoming drab on distal third; inner webs of all but middle pair plain cinnamon rufous except for a slender dusky line along shafts near tips; wing coverts tipped with whitish and narrowly edged with dull cinnamon; tertials edged with whitish; secondaries broadly edged with cinnamon shading into broad edgings of light cinnamon rufous on primaries; chin, throat and breast pale pearl gray; abdomen and under tail coverts white with the faintest tinge of yellowish.

Measurements.—Averages of three adult males; wing, 94.6; tail, 89.3; culmen, 19.6; tarsus, 23.3.

General Notes.—There is some difficulty in distinguishing specimens of *pertinax* from faded ones of *cinerascens*, but the larger bill of *pertinax* and its smaller size are usually sufficiently marked to distinguish them. In fairly fresh plumage *pertinax* is distinctly grayer on the upper parts. The exact limits between the ranges of the two forms is still undetermined.

Myiarchus nuttingi Ridgway.

NUTTING'S FLYCATCHER.

1882. *Myiarchus nuttingi* Ridgway, Proc. U. S. National Museum, V, p. 394.

Type locality.—La Palma, Costa Rica. Type No. 87,391, U. S. National Museum.

Breeding range.—Costa Rica (La Palma); Honduras (on Nicaraguan boundary 180 miles from Pacific Coast); Guatemala (Nenton); Mexico (Ocozucuautla, Chiapas). Not migratory.

Zonal distribution.—Arid and Semi-Arid Tropical.

Specific characters.—Size small, wing not over 88 mm.; back rather light olivaceous brown; inner web of outer tail feather usually almost wholly rufous.

Description of fresh plumage.—Crown olive brown with slightly darker shaft lines, and borders of feathers with a shade of bistre brown; back varying from slightly grayish to yellowish olive, usually with less greenish than in *brachyurus;* upper tail coverts dark broccoli brown shaded and slightly edged with dark raw umber; wing coverts and tertials broadly edged with dingy brownish white, palest on tertials; primaries edged with dark rusty; outer web of outer tail feather light drab; inner web usually plain rufous except a fine line of dusky along shaft near tip, but sometimes with dusky line along shaft much as in *inquietus;* chin, neck and breast dull gray, palest on throat; abdomen and under tail coverts between primrose and sulphur yellow. Upperparts of worn specimens, like the type, are dull grayish, olive brown.

Measurements.—Averages of two adult males: Wing, 86.5 (85-88); tail, 84 (81-87); culmen, 17.2 (17-17.5); tarsus, 22 (21-23).

Adult female (one specimen): Wing,,85; tail, 84; culmen, 17; tarsus, 22.

General notes.—This species has a close general resemblance to

brachyurus and apparently occupies about the same range, for both have been taken along the Pacific coast region from Costa Rica to Chiapas, Mexico. Its smaller size, less greenish upperparts and slightly darker underparts are the main characters. The small bill of *nuttingi* at once distinguishes it among the specimens of *brachyurus* at hand. In the original description of *nuttingi* the specimens cited as belonging to that species, with the exception of the type, all proved to belong to another species which Mr. Ridgway afterwards described as *brachyurus*, thus leaving the type the unique representative of *nuttingi* in the National Museum collection until two others were secured by Mr. Goldman and myself in Chiapas and Guatemala. Through the lack of definite knowledge of just what *nuttingi* represented, quite a number of erroneous citations of this species have been made, and its range unwarrantably extended far beyond its real limits. Attention is called to this in the notes upon *M. cinerascens*.

A specimen in the Bangs collection, taken on the boundary line between Nicaragua and Honduras, 180 miles from the Pacific coast, differs from typical birds in having a well marked dusky line along the shaft on the inner web of outer tail feather, and less conspicuously the same on other tail feathers, as in typical *inquietus*. The size and color, however, show that this is *nuttingi*, and these tail markings merely due to individual variation.

Myiarchus nuttingi inquietus (Salvin and Godman).

GODMAN'S FLYCATCHER.

1889. *Myiarchus inquietus* Salvin and Godman, Biol. Cent.-Am., II, p. 88. March, 1889.

Type locality.—Acahuizotla*, Guerrero, Mexico. Type in British Museum.

Breeding range.—Arid tropical and subtropical parts of southwestern Mexico from central western Chihuahua and southern Sonora to Isthmus of Tehuantepec and inland to southern Puebla. No definite migration, but strays in winter to Guatemala.

Specimens examined from: Sonora (Nacosari, Alamos); Chihuahua (Batopilas, Hacienda San Rafael, El Carmen, Durasno); Sinaloa (Culiacan); Durango, (Chacala); Tepic (Acaponeta); Zacatecas (San Juan Capistrano); Jalisco (La Barca); Michoacan (La Salada, Zamora); Morelos. (Yecapixtla); Puebla (Tehuacan); Guerrero (Acahuizotla, Dos Arroyos, El Rincon, Acapulo, Papayo, El Naranjo, La Lagunilla, Rio Balsas); Oaxaca (Huilotepec, Tehuantepec City, Santa Efigenia, Chihuitan); Chiapas (Gineta Mountains); Guatemala (Nenton).

*This is a small plantation on the road between Acapulco and Chilpancingo. The spelling of the name Acaguisotla given in the original description is erroneous for the owners of the place spell it as given above.

Zonal distribution.—Lower Sonoran and Arid Tropical.

Description of fresh plumage.—Crown grayish bistre brown, a little darker than back; back grayish olive brown, becoming much like *cinerascens* in faded plumage; upper tail coverts light sepia brown, strongly edged and often distinctly colored throughout with tawny olive or rusty olive; primaries, secondaries, tertials and top of tail dark hair brown; wing coverts and tertials edged with dull brownish white, bleaching to dull whitish; primaries (except first) narrowly edged along middle with rusty rufous; chin, neck and breast pale cinereous ashy, little if any darker than in winter specimens of *cinerascens;* abdomen and under tail coverts sulphur yellow; outer web of outer tail feather in some specimens uniform pale hair brown and in others edged more or less with whitish; inner web of this feather cinnamon rufous with a line of dark hair brown (varying somewhat in shade) along shaft beginning on basal third of feather and gradually widening to occupy from one-fourth to entire width of inner web at tip; same pattern repeated with decreasing amount of dusky inward on other feathers except middle pair.

Description of first plumage (♀ Rio Balsas, Guerrero, Mexico, June 3, 1903).—Much like same plumage of *M. cinerascens* but darker; top of head sepia brown with a light wash of dull tawny; back dull, dark hair brown; wing coverts and tertials edged with lighter, varying from pinkish buff to ochraceous buff; upper tail coverts dark cinnamon rufous with dusky shaft streaks; tail cinnamon rufous with bases of middle pair of feathers dusky and a narrow shaft line of same extends thence toward end of feathers gradually broadening to occupy most of feather near tip, but completely bordered by rufous; outer web of outer feather dusky, edged broadly along middle two-thirds with pale buffy whitish; outer web of other tail feathers with broad dusky band along shaft and narrower edging of rufous; inner webs of all except middle pair plain rufous. Underparts from chin over breast pale cinereous ashy; abdomen and under tail coverts pale yellowish white.

Measurements.—Average of ten adult males*: Wing, 91.2 (88-93); tail, 88.4 (85-92); culmen, 18 (17.5-21); tarsus, 22.4 (22-23).

Averages of five adult females*: Wing, 86.8 (85-88); tail, 84.8 (81-87); culmen, 17.2 (17-18); tarsus, 21.5 (21-22).

General notes.—Up to the present time, except for the brief notes published with the original description, this bird has remained comparatively unknown. During the spring of 1903, Mr. Goldman and I secured specimens at the type locality and elsewhere throughout this region, which added to specimens already in the Biological Survey and National Museum form an excellent series covering a wide range in western and southern Mexico. Instead of being, as the describers suggested, "a small resident form of the migratory *M. crinitus* of eastern America, which being isolated in the Sierra Madre del Sur, has acquired distinc-

*Specimens from southwestern Mexico, mainly from the region about the type locality.

tive characters," it is a common resident of western Mexico from Batopilas in western Chihuahua to the Isthmus of Tehuantepec. The specimens from the Isthmus and adjacent part of Chiapas are distinctly intergrades showing that *inquietus* is merely a northern subspecies of *Myiarchus nuttingi*, which latter does not appear to range north of Chiapas.

Nine specimens, representing both sexes, from the Pacific Coast of the Isthmus of Tehuantepec and thence to the border of Chiapas, have the brown line along the inside of the shaft of the outer tail feather considerably reduced, often to half or less the amount found in typical birds. They are also rather smaller than typical birds and their color is otherwise like that of *nuttingi*. This combination of exactly intermediate characters in the birds of this section with the occurence of undoubted *nuttingi* a little farther down in Chiapas and Guatemala appears sufficiently conclusive evidence to warrant placing *inquietus* as a subspecies of *nuttingi*. In general coloration these two forms appear to be practically identical so that they are to be separated only by size and pattern of color on the outer tail feathers.

M. n. inquietus is intermediate in size between *nuttingi* and *cinerascens* and there is a close resemblance in the color of the upper parts of slightly faded specimens of *inquietus* and *cinerascens*. In freshly assumed fall plumage the upper parts of both these species are darker than at any other time. At such times *inquietus* may be distinguished by its darker and browner upper parts and the richer yellow of the abdomen as well as by the tail pattern.

A careful examination of the large series of *inquietus* and *cinerascens* now available has failed to reveal any evidence of intergradation. Birds from the river valleys of western Chihuahua and Sonora differ from *cinerascens* in size and color almost equally with those from Guerrero. The breeding range of *M. inquietus* appears to be complementary to that of *cinerascens*, but during the winter *cinerascens* migrates over the range of *inquietus*.

These two birds have evidently been confused by different authors under the name of *cinerascens* so that without the specimens for verification it will be impossible to satifactorily place some of the winter citations for western and southern Mexico. Summer records within the demonstrated range of either can be more readily handled.

Myiarchus brachyurus Ridgway.

SHORT-TAILED FLYCATCHER.

1887. *Myiarchus brachyurus* Ridgway, Man. N. Am. Birds, p. 334.

Type locality.—Ometepe, Nicaragua. Type No. 91,057, U. S. National Museum.

Breeding range.—Costa Rica (San Lucas, Bahia de Salinas); Nicara-

gua (Ometepe, San Juan del Sur); Mexico (Tonala, Chiapas). Not migratory.

Zonal distribution.—Arid and Semi-Arid Tropical.

Specific characters.—Generally similar to *M. nuttingi* but larger and heavier with much stouter, heavier bill and proportionately shorter tail.

Description of fresh plumage.—Crown dark olive shaded with greenish and a slight buffy suffusion on borders of feathers in some specimens: back lighter olive with a greenish shade (latter nearly or quite absent in worn plumage); back of neck sometimes a little grayer than back; upper tail coverts dark broccoli brown edged and sometimes suffused throughout with dark rusty rufous; primaries, except first one, edged along middle with dark rufous; wing coverts and tertials edged with dull whitish or brownish white with shade of greenish on coverts in some specimens; outer web of outer tail feather pale drab; inner web uniform rufous, sometimes with a narrow inconspicuous line of dusky along shaft; other tail feathers, except middle pair, similar; chin, neck and breast ashy gray palest on chin; abdomen and under tail coverts deep primrose yellow.

Measurements.—Averages of two adult males: wing, 96 (93-99); tail, 86 (85-87); culmen, 21 (21); tarsus, 23.5 (23-24).

Averages of five adult females: wing, 94.4 (93-96); tail, 85.2 (81-87); culmen, 20.7 (19.5-21); tarsus, 22.6 (22-23).

General notes.—In general coloration this species differs but slightly from *M. nuttingi* but may be easily distinguished by differences in size and proportion, and especially by the much larger bill, and more rusty upper tail coverts, Although resembling *crinitus* somewhat in size and pattern of color on outer tail feathers yet the much paler colors above and below readily distinguish them from that species. Like other members of the genus this species gradually fades in spring until the upper parts lose the greenish cast and become dull olive brown.

Myiarchus yucatanensis Lawrence.

YUCATAN CRESTED FLYCATCHER.

1871. *Myiarchus yucatanensis* Lawrence, Proc. Acad. Nat. Sci. Phila., 1871, p. 235. Based on the *Myiarchus mexicanus* Lawrence (nec Kaup) Ann. Lyc. Nat. Hist. N. Y., IX, p. 202, June, 1869.

Type locality.—Merida, Yucatan. Type in American Museum of Natural History (Lawrence Collection).

Breeding range.—Peninsula of Yucatan and Cozumel Island. Not migratory.

Zonal distribution.—Arid or Semi-Arid Tropical.

Specific characters.—Crown bistre brown: upper tail coverts hair brown, slightly if at all edged with russet; inner webs of all but middle

and often outer pair of tail feathers broadly edged with well defined band of cinnamon buff.

Description of fresh plumage.—Crown bistre brown with or without a slight olivaceous shade; back olive; upper tail coverts hair brown with or without slight edging of russet; tail feathers edged externally on basal half with drab, sometimes thinly bordered with dull rusty; primaries (except outer pair) and part of secondaries distinctly edged with rusty rufous; wing coverts broadly tipped with drab or broccoli brown; tertials broadly edged with grayish white; chin, throat and breast rather dark ash gray; abdomen and under tail coverts straw yellow; outer web of outer tail feather drab, varying in shade but usually much lighter than inner web and sometimes edged with whitish; inner webs of all but outer and middle pair of tail feathers with a well defined border of cinnamon buffy covering from one-third to one-half the web; inner web of outer tail feather sometimes plain dusky but more often slightly and sometimes distinctly bordered with cinnamon buffy.

Measurements.—Averages of four adult males: Wing, 84.7 (83-87); tail, 84 (81-85); culmen, 17.5 (17-18); tarsus, 21.8 (21-22.5).

Averages of two adult females: Wing, 78.5 (78-79); tail, 79 (78-80); culmen, 17; tarsus, 21.7 (21.5-21.7).

General notes.—As already noted by Mr. Sclater (Cat. Bds. Brit. Mus. XIV, p. 260), the present species appears to be most nearly related to the *Myiarchus stolidus* group of the West Indies. On the mainland it has no close relative nearer than northern South America.

The proportions of wing and tail vary considerably, and in the series of seventeen specimens examined (mostly not sexed) nine had the tail equalling or longer than the wing and eight had the tail shorter than the wing.

Subgenus **Onychopterus** Reichenbach.

1850. *Onychopterus* Reichenbach, Av. Syst. Nat., t. lxv. Type *Tyrannus tuberculifer* D'Orbigny and Lafresnaye.

This group is characterized by a flattened and proportionately broad bill; the depth at the angle of the gonys being decidedly less than its width at same place. The species in the present paper belonging to this subgenus are *M. lawrencei* with its subspecies and *M. nigriceps*.

Myiarchus lawrencei (Giraud).

LAWRENCE'S FLYCATCHER.

1841. *Muscicapa lawrencei* Giraud, Sixteen Birds of Texas, t. 2, f. 1.

Type locality.—"Texas." The type, No. 47,690 U. S. National Museum, agrees in size and other characters with birds of northeastern Mexico, whence it probably came.

Breeding range.—From near Monterey, Nuevo Leon, in northeastern

Mexico, south in foothill country to the state of Vera Cruz and eastern San Luis Potosi, and thence generally distributed in tropical and subtropical parts of eastern Mexico to the Isthmus of Tehuantepec. At the Isthmus they spread across to the Pacific coast and occupy suitable areas on both coasts in southern Oaxaca, Tabasco, Chiapas, and at least part of Guatemala. They do not occur in the coast belt of northern Tabasco and Campeche, nor the Peninsula of Yucatan, where they are replaced by *M. l. platyrhynchus*. Not migratory.

Zonal distribution.—Arid Tropical in northern. Humid Tropical in southern part of range.

Specific characters.—Crown decidedly darker than back—usually clove brown; back brownish olive; tail feathers strongly edged externally with rufous and inner border of inner webs usually distinctly edged with vinaceous-buffy or cinnamon-buffy.

Description of fresh plumage.—Crown clove brown, sometimes more or less washed with olive, but always much darker than back; back olive, always with a brownish shade, but often with a slight greenish tinge; upper tail coverts broccoli brown edged and often suffused with russet or cinnamon-rufous; secondaries and all but first primary and outer borders of tail feathers strongly edged with dark rusty rufous; wing coverts usually with broad edging of cinnamon or russet varying to isabella color; chin, throat and breast ash gray; abdomen and under tail coverts rich sulphur yellow; inner webs of tail feathers usually with a distinct and often broad border of reddish-buffy, broadest on inner rectrices and often present on middle pair; occasionally this buffy border nearly or quite absent, especially in specimens from southern part of range.

Description of young in first plumage.—Crown seal brown; back dark sepia brown; upper tail coverts dark hair brown broadly edged with russet; tail feathers broadly bordered on both sides by light cinnamon-rufous; wing coverts, tertials, primaries and secondaries strongly edged with rusty vinaceous-cinnamon not very different from color on border of tail feathers; chin and throat light gray shading into olive gray on sides of neck and breast; abdomen and under tail coverts primrose yellow, deepest on middle of abdomen.

Measurements of typical specimens from Tamaulipas and Nuevo Leon.—Averages of six adult males: Wing, 87.7 (82-90); tail, 84.7 (77-89); culmen, 17.1 (16.5-18); tarsus, 21 (20-22).

Averages of five adult females: Wing, 83.8 (80-88); tail, 80.2 (76-84); culmen, 16.8 (16-18); tarsus, 20.2 (20-21).

General notes.—Typical *Myiarchus lawrencei*, characterized by its large size and the amount of rufous edgings on both webs of tail feathers, is found only in northeastern Mexico from Monterey, Nuevo Leon, to northern Vera Cruz. South of this there is a steady decrease in size to the Isthmus of Tehuantepec. This decrease in size is accompanied by a decrease in the amount of rufous bordering the inner webs of the tail feathers. Birds from south of the Isthmus to Guatemala are decidedly smaller than those from the northern part of the range, and

agree closely in this character with *nigricapillus* from Costa Rica, but the colors of upperparts are most like those of typical *lawrencei*, with which I have placed them. The birds from southern Vera Cruz to Guatemala occupy a belt between the ranges of *querulus* on one hand and *platyrhynchus* on the other, and the occurrence of intergrades with these forms and with *nigricapillus* to the south renders the exact determination of many specimens from this region extremely difficult. In cases of this kind one is forced to name specimens arbitrarily or leave them undetermined. The amount of rufous margination to inner webs of tail feathers sometimes covers half the web in specimens from northeastern Mexico, and in southern Vera Cruz and southward individuals occur in which there is little or no trace of it, though they are not numerous. Some specimens from Jalapa and other localities farther south in Vera Cruz have the buffy border on inner webs of tail feathers much restricted and sometimes indistinct. The backs in winter specimens throughout its range in northeastern Mexico vary from dull olivaceous to olivaceous brown. Resident birds from Santa Efigenia, Oaxaca, and from other points on the Pacific slope south of Tehuantepec in Chiapas are more like typical *lawrencei* in size and color than those from the southern part of its range on the Gulf coast.

Myiarchus lawrencei nigricapillus (Cabanis).

COSTA RICAN FLYCATCHER.

1861. *Myiarchus nigricapillus* Cabanis, Journal für Ornithologie, 1861, p. 250 (in text).

Type locality.—Costa Rica. No type nor specific locality mentioned.

Breeding range.—Central America from southern Guatemala to Costa Rica. Not migratory.

Zonal distribution.—Humid Tropical.

Subspecific characters.—Crown blacker than in true *lawrencei;* back darker olive; size smaller.

Description of fresh plumage.—Crown brownish black, sometimes tinged with olive: back dark olive, slightly less grayish than in true *lawrencei;* upper tail coverts dark broccoli brown edged with dark russet or rusty rufous; wing (except first primaries) and tail feathers edged externally with dark russet or rusty rufous; wing coverts bordered with cinnamon or russet; chin, throat and breast dull ash gray, averaging darker than in *lawrencei;* abdomen and under tail coverts rich sulphur yellow; inner border of tail feathers usually with narrow edging of cinnamon buffy, this border occasionally covering one-fourth of web.

Measurements of specimens from Costa Rica and Nicaragua: Averages of four adult males: Wing, 82 (80-83); tail, 77.2 (75-79); culmen, 16.1 (16-16.5); tarsus, 20.2 (20-20.5).

Averages of four adult females: Wing, 76.5 (75-78); tail, 69.5 (66-72); culmen, 16 (16); tarsus, 19.6 (19-20).

General notes.—Birds from Honduras, Nicaragua and Costa Rica, of which I have examined a considerable number, agree closely in size and color. The Honduras birds, however, average a little smaller than those from Costa Rica. There is the usual variation in amount of rufous edgings to outer borders of wings and tail.

Myiarchus lawrencei bangsi subsp. nov.

BANGS'S FLYCATCHER.

Type.—No. 8758, adult male, Collection of E. A. and O. Bangs. From Boquete, Panama. Collected January 26, 1901, by W. W. Brown, Jr.

Breeding range.—Panama. Not migratory.

Zonal distribution.—Humid Tropical.

Subspecific characters.—Crown intensely black; back greenish; inner webs of tail feathers without buffy borders.

Description of fresh plumage.—Crown intensely black; back dark greenish olive; upper tail coverts dark hair brown slightly edged with dull russet; tail bordered externally with dull russet; inner webs of tail feathers plain dusky; wing coverts bordered with isabella color lightly edged with cinnamon; tertials narrowly edged with grayish white; primaries (except two outer ones) finely edged with russet; secondaries more broadly edged with same; chin, throat and breast dull ashy or olive gray; abdomen and under tail coverts between a rich primrose yellow and sulphur yellow.

Measurements.—Adult male (type): Wing, 84; tail, 81; culmen, 15.5; tarsus, 21.

Adult female (topotype): Wing, 78.5; tail, 73; culmen, 16; tarsus, 20.

General notes.—The intensely black crown and greener back serve to distinguish the present form from any of the other subspecies of *M. lawrencei*. The tail is also blacker and less bordered with rufous than in *nigricapillus*, and the bill appreciably smaller. The two specimens from Boquete are the only ones I have seen of *M. l. bangsi*, but they are so different from the numerous specimens of *nigricapillus* at hand that I have no doubt of their representing another subspecies. Citations of *nigricapillus* from Panama undoubtedly refer to the present bird.

Myiarchus lawrencei platyrhynchus (Ridgway).

COZUMEL FLYCATCHER.

1885. *Myiarchus platyrhynchus* Ridgway, Proc. Biol. Soc. Wash., III, p. 23. February 26, 1885.

Type locality.—Cozumel Island, off coast of Yucatan. Type No. 102,738 U. S. National Museum (skinned from alcohol and much decolorized).

Breeding range.—Cozumel Island, Peninsula of Yucatan, and coast region of Campeche and Tabasco, to the Grijalva River. Not migratory.

Zonal distribution.—Arid and Semi-arid Tropical.

Subspecific characters.—Most like *olivascens*, but upper parts darker; back more greenish, and tail coverts, tail and wings darker and more strongly edged with russet or reddish cinnamon; bill averages broader.

Description of fresh plumage.—Crown dark brownish more or less heavily washed with olive; back slightly greenish olive; upper tail coverts broccoli brown edged and sometimes shaded with russet or reddish cinnamon; tail feathers edged externally like upper coverts; all but two outer primaries narrowly and secondaries more broadly edged externally with russet like tail; wing coverts broadly tipped with dark isabella brown; chin, throat and breast ashy gray; inner webs of tail feathers usually plain dusky, but occasional individuals have narrow buffy edges along inner borders of inner feathers. Worn specimens lose nearly or quite all the greenish shade on back and the rusty edgings to wings and tail.

Measurements of specimens from Cozumel Island:—Averages of five adult males: Wing, 81 (79-83); tail, 77.7 (74-82); culmen, 17 (16.5-17.5); tarsus, 20.2 (20-20.5).

Averages of two adult females: Wing, 75 (75); tail, 69 (69); culmen, 16 (16); tarsus, 18.5 (18-19).

Mainland specimens average about the same.

General notes.—A series of 33 specimens in the Biological Survey and National Museum collections, from various localities covering the range given above, show conclusively that the birds from this region and especially from Yucatan which were formerly referred to *lawrencei* and later to *olivascens* are identical with *platyrhynchus*, described by Mr. Ridgway from Cozumel Island. This form occupies the comparatively arid region of northern Yucatan and the adjacent coastal area to the exclusion of true *lawrencei*, which belongs to the more humid interior bordering the Cordillera.

Among the entire series only a single specimen, and it is from Cozumel Island, has a buffy border to inner webs of inner tail feathers.

In view of their wide separation, necessarily distinct origin and different environment, the close general similarity between *platyrhynchus* and *olivascens* is interesting. It is another of the many cases in which great similarity exists between widely separated forms of a species with one or more decidedly more differentiated forms occupying the intervening area. The greater humidity of the habitat of *platyrhynchus* accounts for the somewhat darker colors of this form in comparison with the paler and grayer colors of *olivascens*.

Myiarchus lawrencei querulus subsp. nov.

QUERULOUS FLYCATCHER.

Type.—No. 185,220, adult male, U. S. National Museum, Biological Survey Collection. From Los Reyes, Michoacan, Mexico. Collected February 17, 1903, by E. W. Nelson and E. A. Goldman.

Breeding range.—Southern end of Mexican tableland from central Jalisco, Michoacan, Hidalgo and state of Mexico south through Colima, Guerrero, part of Puebla and Oaxaca to Isthmus of Tehuantepec, where it passes into true *lawrencei*. Not migratory.

Zonal distribution.—Arid Tropical to Upper Sonoran.

Subspecific characters.—Color most like *platyrhynchus* but size larger (almost equalling *lawrencei* from northeastern Mexico), and inner borders of tail feathers usually more or less edged with buffy.

Description of fresh plumage.—Crown nearly clove brown, with a slight wash of olive, distinctly darker than back; back slightly grayish olive but darker and more greenish than in *olivascens;* upper tail coverts dark hair brown, more or less bordered and shaded with cinnamon; outer edges of tail feathers thinly bordered with russet; wing coverts tipped with isabella color; secondaries and all but outer primaries narrowly edged with russet; chin, throat and breast clear ash gray; abdomen and under tail coverts rich straw yellow; inner webs of inner tail feathers usually narrowly bordered with ochraceous buffy.

Young in first plumage.—The same as in *lawrencei*, but paler, especially on crown and underparts.

Measurements.—Averages of ten adult males: Wing, 86.1 (83-90); tail, 83.3 (80-86); culmen, 17.3 (17-18); tarsus, 19.6 (19-20).

Averages of five adult females: Wing, 81.6 (78-87); tail, 79.2 (76-83); culmen, 17 (16.5-17.5); tarsus, 19.4 (19-20).

General notes.—Specimens of the present form have hitherto been confused with the smaller and paler *olivascens*, but the Biological Survey series from all parts of western and southern Mexico make it plain that there are two recognizable forms on the mainland north of the Isthmus of Tehuantepec. The southern one, *querulus*, occupies an area lying between the more arid home of *olivascens* and the still more humid one of true *lawrencei*. One of the unexpected characters of *querulus* is its large size—almost the same as of *lawrencei* of northeastern Mexico, and considerably exceeding that of *olivascens* or of the representatives of *lawrencei* where their two ranges come in contact. Its large size also separates it at once from *platyrhynchus*. It is paler than *lawrencei* and with less strongly marked rufous borders to wings and tail. Some specimens, especially from Hidalgo and certain other tableland localities, sometimes lack the buffy inner edging to the tail feathers, but their large size and general coloration distinguishes them.

Myiarchus lawrencei olivascens Ridgway.

OLIVACEOUS FLYCATCHER.

1884. *Myiarchus lawrencei olivascens* Ridgway, Proc. Biol. Soc. Wash., II, p. 91.

Type locality.—Santa Efigenia, Oaxaca. Type No. 57,655 U. S. National Museum.

Breeding range.—Southern Arizona and thence south in western Mexico, west of the Sierra Madre to northern Tepic.

Migrates from northern part of its range south throughout southwestern Mexico to Chiapas and inland through Michoacan and Guerrero. Resident in southern part of breeding range.

Zonal distribution.—Lower Sonoran and Arid Tropical.

Subspecific characters.—Decidedly smaller than true *lawrencei;* upper parts grayer and rectrices only slightly if at all edged with pale cinnamon.

Description of fresh plumage.—Crown olive brown, but slightly darker than back; back grayish olive with but slight if any indication of greenish: upper tail coverts hair brown usually but not always edged with pale cinnamon; outer edges of tail feathers, secondaries and all but two outer primaries edged with slightly darker shade of cinnamon; wing coverts vary from drab to isabella color; inner webs of inner tail feathers usually plain dusky but sometimes with a slight buffy edge along inner border; chin, throat and breast ashy gray; abdomen and under tail coverts varying from sulphur yellow to straw yellow.

Measurements of specimens from southern Arizona:—Averages of ten adult males: Wing, 81.5 (76-85); tail, 77.9 (73-81); culmen, 16.6 (16-17); tarsus, 18.9 (18-20).

Averages of ten adult females: Wing, 76.4 (75-78); tail, 72.5 (70-75); culmen, 16.1 (15-17); tarsus, 18.1 (17.5-19).

General notes.—The type of *olivascens* came from Santa Efigenia, Oaxaca, close to the border of Chiapas, where the resident birds are nearly typical *lawrencei* both in size and color. The type of *olivascens* is in winter plumage and agrees in every way with birds from northwestern Mexico and southern Arizonia. From this it is practically certain that this individual was a winter visitant from the north. The birds of southern Arizona may be considered typical of the form.

M. olivascens is apparently not numerous in winter south of Guerrero. The Bangs collection contains one specimen taken on April 4, at Patzcuaro, Michoacan, which was probably a migrant. Among a series of over fifty specimens at hand only a few have indications of a buffy border along the inner edge of the tail feathers, and most of these are intergrades from along the southern border of its range where it merges into *querulus.* There is also a gradual increase southward in size.

Myiarchus lawrencei tresmariæ subsp. nov.

TRES MARIAS FLYCATCHER.

Type.—No. 156,810, adult male, U. S. National Museum, Biological Survey Collection. From Maria Madre Island, Tepic, Mexico. Collected May 5, 1897, by E. W. Nelson and E. A. Goldman.

Breeding range.—Tres Marias Islands, Tepic Ty., Mexico. Not migratory.

Zonal distribution.—Arid Tropical.

Subspecific characters.—Palest and grayest of the forms of *lawrencei*, with slight buffy borders on inner webs of inner tail feathers; bill proportionately longer and broader than in *olivascens*.

Description of slightly worn plumage.—Upperparts hair brown, only slightly darker on crown; upper tail coverts drab thinly edged with pale cinnamon; tail feathers thinly edged externally with same; inner primaries and secondaries very finely edged externally with same; wing coverts tipped with drab; chin, throat and breast dingy ash gray, duller than in *olivascens;* abdomen and under tail coverts straw yellow; inner webs of inner tail feathers usually with narrow border of buffy; bill larger and broader than in *olivascens*.

Measurements.—Adult male (type); Wing, 79; tail, 75; culmen, 18; width of culmen, 9; tarsus, 21.

Average of seven adult females: Wing, 76.1 (73-80); tail, 74.4 (70-79). culmen, 16.8 (16-18); width of culmen, 9.1 (9-9.5); tarsus, 19.6 (19-20.5);

General notes.—The present form only needs comparison with *olivascens*, from which it is easily distinguished by the characters mentioned.

Myiarchus nigriceps Sclater.

BLACK CROWNED FLYCATCHER.

1860. *Myiarchus nigriceps* Sclater, Proc. Zool. Soc. London, 1860, p. 68.

Type locality.—Pallatanga, Ecuador. Type in British Museum.

Breeding range.—Over a large part of northern South America from the valley of the Amazon to Panama (including San Miguel Island). Not migratory.

Zonal distribution.—Mainly Humid Tropical but ranging above this to 9500 feet in Peru (Biologia Cent.-Am., II, p. 96).

Specific characters.—Crown slaty black; back olive greenish; wings and tail of adult without rufous edgings.

Description of fresh plumage.—Crown slaty black; back olive greenish; upper tail coverts hair brown slightly edged with tawny olive; tail feathers edged externally with hair brown varying to isabella color; outer web of outer feather drab, paler than inner web; inner webs plain dusky; outer primaries without external edging; inner primaries with

or without a fine grayish edging; secondaries narrowly edged with light drab often tinged with greenish; tertials dingy whitish sometimes inclining to drab; wing coverts drab; inner borders of wing feathers salmon buffy; chin, throat and breast ash gray; abdomen and under tail coverts canary yellow varying to sulphur yellow.

Description of young in first plumage.—Crown dull sooty black; back dingy olive: upper tail coverts sepia brown edged with dark russet; wing coverts, tertials and secondaries rusty cinnamon, palest on tertials; inner primaries thinly edged with russet; inside of wing feathers bordered with salmon buffy; tail feathers narrowly bordered on both webs by cinnamon rufous; chin, throat and breast ashy gray; abdomen and under tail coverts primrose yellow.

Measurements.—Averages of ten adult males from northern Colombia: Wing, 81.7 (80-83); tail, 76.3 (74-78); culmen, 17.1 (17-18); tarsus, 19.6 (18.5-20.5).

Averages of five adult females from northern Colombia: Wing, 77.2 (73-83); tail, 72 (68-76); culmen, 16.6 (16-17); tarsus, 19.4 (18-20.5).

General notes.—The adults of this species in size and general style of coloration resemble *M. nigricapillus* and *M. bangsi*, except that they completely lack the rufous edgings to wings and tail found in those birds. The first plumage of *nigriceps* is much like the young of *lawrencei* but the upper parts are darker and the rufous borders to the tail feathers are decidedly narrower. Whether the ranges of this species and *M. bangsi* overlap or are complementary remains to be determined.

Myiarchus brunneiceps Lawrence, Ann. Lyc. Nat. Hist. N. Y., VII, 327, June, 1861, from Lion Hill, Panama, is a synonym of *M. nigriceps*.

M. nigriceps is a wide ranging South American species with *M. lawrencei* and subspecies as its nearest relatives in North America.

Vol. XVII, pp. 51-52 March 10, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW BATRACHIAN FROM SARAWAK, BORNEO.

BY THOMAS BARBOUR.

Among a small collection of Batrachians taken in Sarawak, Borneo, by Mr. W. T. Hornaday, there are two specimens of an apparently undescribed species of toad. This species is nearly related to *Nectes subasper* Tschudi, from Java.

Nectes obscurus sp. nov.

Differing from *N. subasper* in the size of the tympanum; the size of the nostrils; the width of the upper eyelid; and in the distinctness of the metatarsal tubercles.

Head rather small; snout oblique and obtusely angular; nostrils very small, opening upward and slightly outward; upper eyelid wide; space between the eyes rather broad; tympanum distinct but small, less than one-half the diameter of the eye; fingers slender, the first a very little shorter than the second; toes long and slender, united by a rather narrow membrane; subarticular tubercles distinct; two large metatarsal tubercles. When the hind limb is carried forward along the body, the tarso-metatarsal articulation reaches a considerable distance beyond the tip of the snout. Upper surfaces and sides covered with round and conical warts of unequal size, the largest evidently porous and arranged in two irregular lines on the dorsal surface. The lower surfaces are covered with rather fine granules of unequal size.

Color (alcoholic specimens), olivaceous above, lighter below; the hind legs banded and mottled with a darker color.

Type No. 2396, Barbour collection, Museum of Comparative Zoölogy, Cambridge, Mass.

VOL. XVII, PP. 53-54 MARCH 21, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

HAPLOMYLOMYS, A NEW SUBGENUS OF *PEROMYSCUS*.

BY WILFRED H. OSGOOD.

The genus *Peromyscus*, as at present recognized, contains a larger number of species than any other North American genus of mammals. It has a comparatively wide range, and, although subject to numerous minor variations, preserves its essential characters with remarkable uniformity. Thus far only two subgeneric names have been proposed for subordinate groups within the genus—*Baiomys*, erected by True in 1894* for the tiny species *P. taylori*, and *Megadontomys*, proposed by Merriam in 1898† for the largest species of the genus *P. thomasi*. Both of these are well characterized, but represent aberrant types rather than assemblages of species. *Baiomys* contains only two well-marked species (each possibly divisible into several subspecies) and *Megadontomys* is represented by only the type species and two closely related forms. All the other species are at present retained in

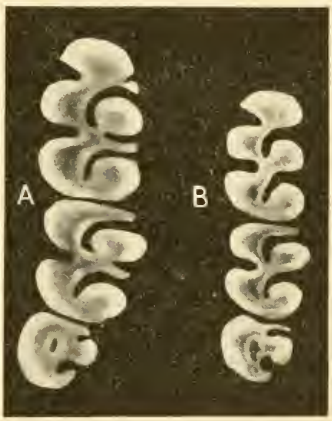

FIG. 1.—A. Upper molars of *Peromyscus* (*Peromyscus*) *felipensis*. B. Upper molars of *Peromyscus* (*Haplomylomys*) *californicus*. (About × 9½).

* Proc. U. S. Nat. Mus., XVI, p. 758, 1894.

† Proc. Biol. Soc. Wash., XII, pp. 115–116, April 30, 1898; see also Bangs, Bull. Mus. Comp. Zool., XXXIX, p. 27, 1902, where *Megadontomys* is given generic rank.

the restricted genus *Peromyscus*, typified by the common *P. leucopus* of the eastern United States.

A small group containing two well-known species and numerous subspecies found in the arid and semi-arid regions of the southwestern United States and northern Mexico seems also worthy of subgeneric recognition. Although not differing as a group in any external characters that are diagnostic, it is sharply defined by peculiarities of the molar teeth, which are so constant and, comparatively speaking, so pronounced as to be of considerable significance.

The important forms of this group are *P. eremicus* and *P. californicus*, characterized by a less complex tuberculation of the molar teeth than in *Peromyscus* proper or in *Megadontomys*. In the ordinary type of *Peromyscus* there is a small accessory tubercle between the primary outer tubercles of the first and second upper molars. In unworn teeth these tiny tubercles are scarcely noticeable, except as viewed in profile. When the crowns of the molars become worn, however, they appear as narrow enamel loops with closely appressed sides, lying between the more or less open primary loops. These small tubercles are not present in the group heretofore loosely called the 'eremicus' group. They are also absent in *Baiomys*, which, however, is otherwise peculiar. They are developed to various degrees in various species, in some being difficult to observe, except in teeth that have been subjected to considerable wear. Apparently they are least prominent in *P. crinitus* and its close allies.

The appearance of partly worn teeth is shown in the accompanying reproduction of photographs of actual specimens. For purposes of illustration, two of the larger species were selected. In essential characters their teeth do not differ from those of the type species of their respective groups.

The new subgenus may be characterized as follows:

Haplomylomys subgen. nov.

Type.—Peromyscus eremicus (Baird), from Fort Yuma, California.

Characters.—Size medium or small; pelage usually very soft and silky; tail longer than head and body, subterete, rather thinly haired; soles of hind feet naked (at least in median line) to calcaneum, 6-tuberculate and paved with minute imbricate scales; skull with cranium rather large and rostral region relatively weak; first and second upper molars with three salient and two reëntrant outer angles at all stages of wear; small secondary tubercles never present between outer primary tubercles; lower molars correspondingly simple.

VOL. XVII, PP. 55-77 MARCH 21, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THIRTY NEW MICE OF THE GENUS *PEROMYSCUS* FROM MEXICO AND GUATEMALA.

BY WILFRED H. OSGOOD.

The mice of the genus *Peromyscus*, so well represented in the United States and so well known for their numerous specific and subspecific variations, reach their highest development south of our borders in Mexico. This is the region of their greatest abundance, both in actual numbers and in specific types. Some are closely related to forms found in the United States, but the majority are entirely different.

The thorough work of E. W. Nelson and E. A. Goldman in this region has resulted in the acquisition of very large numbers of specimens of this genus, and now for the first time it is possible to learn the number and diversity of their specific and subspecific forms. Specimens of *Peromyscus*, from Mexico and Guatemala alone, to the number of nearly 3,400, are now in the collection of the U. S. Biological Survey. This is unquestionably in excess of the combined number in all other collections in the world, and it is therefore not surprising that a comparatively large number of new forms should be found among them.

The descriptions herewith are presented in advance of a revision of the entire genus, now in preparation, in which it is hoped that all the known forms may be fully discussed.

I take pleasure in making acknowledgments to Dr. C. Hart Merriam, to whom I owe the opportunity of elaborating this

rich material and to whom I am indebted for much valued criticism and advice. It was also my privilege to be somewhat associated with Dr. Merriam during his preparation of a preliminary paper on the same group several years ago,* an experience which is now of the utmost value to me. During the work I have been greatly assisted by Mr. Nelson, and the advantage of having at my disposal his intimate knowledge of the physiographic conditions of Mexico has been much appreciated.

Subgenus **Peromyscus** Gloger.

Peromyscus sonoriensis blandus subsp. nov.

Type from Escalon, Chihuahua, Mexico. Adult female, No. 57,635, U. S. National Museum, Biological Survey Collection, November 27, 1893, E. A. Goldman.

Characters.—Similar to *P. sonoriensis*,† but smaller; tail shorter (usually less than 75); color more vinaceous.

Color.—Type, in full winter pelage: Upper parts vinaceous buff, uniformly sprinkled with dusky; a narrow lateral line of vinaceous buff; lanuginous ear tufts conspicuous, mixed white and buff; under parts creamy white; ears chiefly whitish with a wide dusky area on flexure; tail sharply bicolor; feet white, ankles with traces of dusky and buffy.

Skull.—Similar to that of *sonoriensis*, but somewhat smaller; nasals averaging wider, particularly at their posterior ends.

Measurements.—Type: Total length, 145; tail vertebræ, 61; hind foot, 21. Average of seven adult topotypes: 161; 69; 21.4. Skull of type: Greatest length, 25.4; basilar length of Hensel, 19.7; zygomatic width, 12.5; interorbital constriction, 4; interparietal, 8 x 1.9; nasals, 9.8 x 2.5; bony palate, 3.5; palatine slits, 5.7 x 2; diastema, 6.7; postpalatal length, 9.1; upper molar series, 3.8.

Remarks.—This is the common short-tailed mouse of northeastern Mexico. The limits of its range have not yet been thoroughly worked out, but it is represented from numerous localities in Mexico east of the Sierra Madre and extends north to western Texas. It is easily distinguished from *P. texanus* of the same region by numerous characters, among which may be mentioned the following: Size smaller; tail shorter; color more vinaceous; pelage softer; subauricular spots more prominent and nearly always extensively white; nasals broader and flatter; premaxillæ less swollen laterally; braincase smaller. Its vinaceous color and small size distinguish it from *sonoriensis*, which is found chiefly west of the Sierra Madre.

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*These Proceedings, Vol. XII, pp. 115–125, April 30, 1898.

† Nos. $\frac{20602}{35762}$ and $\frac{20703}{35860}$ U. S. N. M., from Santa Cruz River, Sonora, have been used to represent *P. sonoriensis*.

Peromyscus sonoriensis fulvus subsp. nov.

Type from Oaxaca City, Oaxaca, Mexico. Adult male, No. 68,655, U. S. National Museum, Biological Survey Collection, June 12, 1894, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. sonoriensis*, but color darker and more rufescent; skull with anterior part of zygoma heavier and more deeply notched by infraorbital foramen.

Color.—General color of upper parts russet, deepening in middle of back to mars brown and Prout's brown; under parts creamy white; ear tufts prominent, buffy or pale creamy; tail sharply bicolor, brown above, white below; feet and forelegs white; outer side of ankles brownish.

Skull.—Similar to that of *P. sonoriensis* but more angular; anterior part of zygoma heavier and more deeply notched by infraorbital foramen; similar to that of *P. labecula* but smaller and shorter; zygomata not so heavy nor so broadly expanding anteriorly; nasals rather short and broad.

Measurements.—Type: Total length, 167; tail vertebræ, 68; hind foot, 22. Average of 10 adults from Chalchicomula, Puebla: 162 (150–183); 71.5 (65–78); 22. Skull of type: Greatest length, 25; basilar length of Hensel, 19.5; zygomatic width, 12.8; interorbital constriction, 4; interparietal, 8 x 2.1; nasals, 10; bony palate, 3.7; palatine slits, 5.6 x 2; diastema, 6.5; postpalatal length, 8.7; upper molar series, 3.8.

Remarks.—*P. s. fulvus* is the southernmost representative of the well-known *sonoriensis* group of small short-tailed mice. It is found from Oaxaca north to Puebla and parts of Vera Cruz and Hidalgo. Its near relatives are *P. s. blandus* and *P. s. labecula*.* In general terms, *blandus* is small and vinaceous, *fulvus* is medium sized and rufescent, and *labecula* is large and more inclined to duskiness. The intergradation of all three and their connection with typical *sonoriensis* are scarcely to be doubted.

Peromyscus texanus mesomelas subsp. nov.

Type from Orizaba, Vera Cruz, Mexico. Adult male, No. 58,210, U. S. National Museum, Biological Survey Collection, January 20, 1894, E. W. Nelson and E. A. Goldman.

Characters.—Most similar to *P. t. mearnsi*; color darker; tail shorter; hind foot larger; a small pectoral spot present; adolescents with an intense black dorsal stripe.

Color.—Adult: General effect of upper parts pale Prout's brown, produced by fawn ground color with a liberal mixture of dusky; sides practically unicolor with back; no definite dusky markings about head; under parts creamy white except a small but distinct pectoral spot of fawn color; ears dusky with whitish edges; feet white, ankles dusky

* Elliot, Field Col. Mus., Zoöl. Ser., III, pp. 143–144, March, 1903.

brownish; tail bicolor. Immature: Similar in general to adult, but more sooty; sides dark mouse gray, tinged with fawn and bordered by a narrow fawn-colored lateral line; a broad stripe in median dorsal region intense black; ankles sooty; tail indistinctly bicolor.

Skull.—Similar to that of *P. t. mearnsi*, but with braincase averaging slightly larger and wider; nasals rather long and palatine slits usually corresponding.

Measurements.—Type: Total length, 169; tail vertebræ, 76; hind foot, 23. Skull of type: Greatest length, 26.5; basilar length of Hensel, 20.2; zygomatic width, 13.6; interorbital constriction, 4; interparietal, 8.6 x 2.3; nasals, 10.4; bony palate, 3.8; palatine slits, 5.2 x 2; diastema, 6.9; postpalatal length, 9.1; upper molar series, 3.7.

Remarks.—Although this form is very well characterized, there seems to be no doubt that it is connected, through *P. t. mearnsi*, with *P. texanus* and others of the same group. Specimens from Rio Verde, San Luis Potosi, are quite evidently intermediate, and a series from Metlaltoyuca, Puebla, while distinctly referable to *mesomelas*, shows some tendencies toward *mearnsi*. *P. mesomelas* is also related to *P. affinis*, which is a much paler form and not apt to be confused with it. Like *mearnsi* and *affinis*, it has short and relatively harsh pelage somewhat different from that of most other Mexican species.

Peromyscus texanus castaneus subsp. nov.

Type from vicinity of Yohaltun, Campeche, Peninsula of Yucatan, Mexico. Adult male, No. 107,980, U. S. National Museum, Biological Survey Collection, December 19, 1900, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. t. mesomelas*, but smaller and more ferruginous colored; under parts without pectoral spot; adolescents without black dorsal stripe; skull and teeth small.

Color.—Type, in fresh pelage: General color of upper parts between Prout's brown and burnt umber, clearer on sides, darker on back; ground color rich dark fawn; no definite lateral line; under parts pure white; feet white, ankles brownish. Topotype No. 107,982, in slightly worn pelage: Sides and upper parts nearly uniform cinnamon rufous with scarcely any dusky admixture and only a narrow line on back somewhat deeper colored than rest of upper parts. Immature: As in adult but grayer.

Skull.—Rather small and light; braincase relatively narrow; nasals and palatine slits short; molar teeth small; otherwise similar to *P. t. mesomelas.*

Measurements.—Average of 10 adult topotypes: Total length, 163 (156–169); tail vertebræ, 73 (68–79); hind foot, 21.5 (20–22). Skull of type: Greatest length, 25.3; basilar length of Hensel, 19; zygomatic width, 13; interorbital constriction, 4; interparietal, 8 x 2.3; nasals, 9.3; bony palate, 4; palatine slits, 4.2 x 1.9; diastema, 6.2; postpalatal length, 9.5; upper molar series, 3.5.

Remarks.—*P. t. castaneus* is nearly the same color as *P. cozumelæ*, which is closely related. *P. cozumelæ* differs chiefly in larger size and heavier teeth. No specimens from the humid tropical region between Orizaba and Yohaltun are at hand, but *castaneus* is not sufficiently different from *mesomelas* to warrant full specific rank. *P. affinis* is a related form of the adjacent arid tropics, and much paler than either *castaneus* or *mesomelas*.

Peromyscus melanotis zamelas subsp. nov.

Type from Colonia Garcia, Chihuahua, Mexico (altitude 6700 feet). Adult female, No. 98,197, U. S. National Museum, Biological Survey Collection, July 23, 1899, E. W. Nelson and E. A. Goldman.

Characters.—Similar in general to *P. melanotis* but coloration more sooty; size small; tail short; skull not peculiar.

Color.—Sides dark cinnamon rufous, densely clouded with sooty; broad stripe from top of head to base of tail intense black; orbital ring and base of whiskers black; sides of face suffused with sooty; a cinnamon rufous patch below eye continuous with a narrow lateral line of the same color; feet white; tail sharply bicolor, black above, white below; under parts white subdued by plumbeous under-color.

Skull.—Practically as in *melanotis;* size quite small; molar teeth particularly small.

Measurements.—Type: Total length, 160; tail vertebræ, 63; hind foot, 20. Skull of type: Greatest length, 25.9; basilar length of Hensel, 19.3; zygomatic width, 13; interorbital constriction, 4; interparietal, 8 x 2.2; nasals, 11; bony palate, 3.8; palatine slits, 5.3 x 2.1; diastema, 7; postpalatal length, 8.5; upper molar series, 3.3.

Peromyscus attwateri pectoralis subsp. nov.

Type from Jalpan, Queretaro, Mexico. Adult male, No. 81,236, U. S. National Museum, Biological Survey Collection, August 30, 1896, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. attwateri*, but richer colored and having a prominent buffy pectoral spot; tail longer; size medium (hind foot 21–23); superficially similar to *P. eremicus;* color darker and more vinaceous; pelage slightly less silky; tail longer and more hairy; soles of hind feet naked or with slight hairiness on heel; ankles usually white; skull rather heavy; molar teeth with small accessory tubercles of subgenus *Peromyscus*.

Color.—Type, in fresh fall pelage: Ground color of upper parts pale ochraceous buff with a thick sprinkling of dusky, producing an effect nearly the shade of wood brown; sides of head behind eyes grayish; a narrow blackish orbital ring; a distinct buffy ochraceous pectoral spot usually present; feet, and in most cases ankles, white; under parts white; tail dusky above, white below.

Skull.—About as in *P. attwateri;* somewhat similar to that of *P. levipes* but smaller, with smaller teeth; lachrymal region less swollen; nasals rather long and broad; zygomata somewhat compressed anteriorly, not elbowed squarely; premaxillæ usually ending beyond nasals; interparietal rather large; audital bullæ quite small, smaller than in *levipes* or *eremicus.*

Measurements.—Type: Total length, 210; tail vertebræ, 114; hind foot, 22. Average of 10 adults from various localities: 200; 112; 21.5. Skull of type: Greatest length, 27; basilar length of Hensel, 19.7; zygomatic width, 13.7; interorbital constriction, 4.2; nasals, 9.9; bony palate, 3.7; palatine slits, 4.9 x 2; diastema, 6.3; postpalatal length, 9.4; upper molar series, 3.8.

Peromyscus attwateri eremicoides subsp. nov.

Type from Mapimi, Durango, Mexico. Adult male, No. 57,729, U. S. National Museum, Biological Survey Collection, December 15, 1893, E. A. Goldman.

Characters.—Similar to *P. attwateri*, but smaller and paler; skull small and light; audital bullæ very small; ears small; soles of hind feet naked.

Color.—Upper parts mixed pinkish buff and dusky, producing the general effect of pale broccoli brown; lateral line pinkish buff; underparts pure creamy white without trace of pectoral spot; facial region between eye and ear grayish; feet and ankles white; tail dusky above, white below. In some specimens, doubtless the younger ones, the general effect is gray, while in others a delicate shade of pinkish buff predominates.

Skull.—Similar in general to that of *attwateri* but decidedly smaller; audital bullæ very small; nasals short; interorbital constriction relatively wide; rostrum depressed.

Measurements.—Type and one topotype: Total lengths, 180; 195; tail vertebræ, 102; 111; hind feet, 20; 21. Skull of type: Greatest length, 24; basilar length of Hensel, 18; zygomatic width, 12; interorbital constriction, 3.9; interparietal, 8.3 x 3; nasals, 8.5; bony palate, 3.5; palatine slits, 4.5 x 1.5; diastema, 5.8; postpalatal length, 8.5; upper molar series, 3.5.

Remarks.—This form is readily distinguishable from both *attwateri* and *pectoralis* by its pale color, small ears, and very small skull. Its resemblance to *P. eremicus*, particularly in immature and worn pelages, is remarkable. The only external characters by which it may be distinguished are its longer, slightly more hairy tail and pure white ankles. Neither of these characters, however, is to be depended upon, as the tail in *eremicus* is often quite hairy, and the dusky on the ankle frequently so little developed as to be scarcely apparent. The molar enamel pattern, except in extremely worn teeth, is always diagnostic, *eremicoides* having the small accessory cusps and *eremicus* being without them.

Specimens examined.—Total number 10, from localities in Mexico as follows: *Coahuila*, Jimulco, 4; *Durango*, Inde, 4, Mapimi, 2.

Peromyscus polius sp. nov.

Type from Colonia Garcia, Chihuahua, Mexico. Old female, No. 98,226, U. S. National Museum, Biological Survey Collection, June 26, 1899, E. W. Nelson and E. A. Goldman.

Characters.—Somewhat similar to *P. boylei rowleyi*, but decidedly larger and grayer colored; skull large and stoutly built, with large teeth and relatively small audital bullæ.

Color.—General color of upper parts grayish broccoli brown, produced by a ground color of pinkish buff mixed with dusky; lateral line clear pinkish buff; head slightly more grayish than body, particularly on cheeks; a narrow dusky orbital ring; lanuginous tuft at base of ear occasionally tinged with white; under parts pure white; feet and ankles white; tail bicolor.

Skull.—Similar in general to that of *rowleyi*, but larger; molar teeth decidedly larger; palatine slits longer; audital bullæ actually about same size, relatively smaller; otherwise not peculiar.

Measurements.—Average of 8 adult topotypes: Total length, 218.5 (210–234); tail vertebræ, 117 (111–120); hind foot, 25.8 (25–26). Skull of type: Greatest length, 29.9; basilar length of Hensel, 22.9; zygomatic width, 14.8; interorbital constriction, 4.5; interparietal, 10.5 x 2.8; nasals, 11.6; bony palate, 4.4; palatine slits, 6 x 2; diastema, 7.4; postpalatal length, 10; upper molar series, 4.7.

Remarks.—This species nearly equals *P. difficilis* in size, but its shorter tail and ears readily distinguish it without recourse to the skull, in which the audital bullæ are scarcely more than half the size of those of *difficilis*. Its real relationship is undoubtedly with *rowleyi* and *attwateri*. It is apparently an isolated species, and is not the general Mexican representative of this group, for practically typical *rowleyi* occurs as far south at least as central Zacatecas. Its pure white ankles, as well as its large size and pale color, afford convenient characters for readily recognizing it.

Peromyscus gratus gentilis subsp. nov.

Type from Lagos, Jalisco, Mexico. Adult male, No. 78,937, U. S. National Museum, Biological Survey Collection, June 27, 1896, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. gratus* but paler; sides of head much more fulvous; molar teeth slightly smaller.

Color.—New pelage: Upper parts pale ochraceous buff lightly mixed with dusky; middle of back with a slight concentration of dusky tipped hairs; top of head, ear tufts, etc., with a predominance of buffy; sides of head nearly clear ochraceous buff, with a slight tinge of grayish between eye and base of ear; eyelids black; under parts white; hands and feet white; ankles dusky; tail bicolor, blackish above, white below. Worn pelage: Upper parts varying from clear bright ochraceous buff on back and rump to grayish buff about head and shoulders, sometimes with

a fine mixture of cinnamon tipped hairs throughout; under parts white; tail dusky brownish above, white below.

Skull.—As in typical *P. gratus*, having the same large braincase, short depressed rostrum, and relatively large audital bullæ; molar teeth slightly smaller.

Measurements.—Average of 10 adult topotypes: Total length, 201 (194–210); tail vertebræ, 111.7 (103–120); hind foot, 23.8 (23–24.5). Skull of type: Greatest length, 27.2; zygomatic width, 14; nasals, 9.5; interorbital constriction, 4.4; upper molar series, 4.

Remarks.—Apparently there are two forms of the *P. gratus* type found in Mexico, one very dark with dusky grayish head and cheeks, the other much paler with less dusky or grayish and more ochraceous on the head and cheeks. The extreme of the dark form is shown in a series from Zamora, Michoacan. Typical *gratus* from Tlalpam, Mexico, is unquestionably referable to the dark form, although not so extreme as the specimens from Zamora. The light form, which is therefore named, is most extreme in specimens from Lagos, Jalisco. Various degrees of intergradation are shown by specimens from a number of localities.

Peromyscus amplus sp. nov.

Type from Coixtlahuaca, Oaxaca, Mexico. Adult female, No. 70,158, U. S. National Museum, Biological Survey Collection, November 12, 1894, E. W. Nelson and E. A. Goldman.

Characters.—Most similar to *P. felipensis*, but very much paler; pelage long and soft; color very uniform, with scarcely any dark dorsal area; skull with somewhat inflated braincase.

Color.—Type: General effect of upper parts uniform clay color produced by a ground color of ochraceous buff and a fine 'peppery' mixture of dusky; lateral line rather broad, ochraceous buff; forehead and orbital region from posterior base of whiskers to ear grayish; anterior base of whiskers buffy; under parts creamy white with a well-developed ochraceous buff pectoral spot; feet white, ankles dusky; tail white below, dusky brownish above.

Skull.—Very similar to that of *felipensis*, but braincase slightly higher and more inflated; anterior part of skull depressed; audital bullæ large.

Measurements.—Average of 10 adult topotypes: Total length, 248 (235–260); tail vertebræ, 136 (128–145); hind foot, 27 (26–28). Skull of type: Greatest length, 30.4; basilar length of Hensel, 23; zygomatic width, 10.4; interorbital constriction, 4.5; interparietal, 10.4 x 3.7; nasals, 11.3; bony palate, 4.6; palatine slits, 6 x 2.3; diastema, 7.9; postpalatal length, 10.2; upper molar series, 4.8.

Remarks.—*P. felipensis*, to which *amplus* is related, is essentially a black mouse, whereas the predominating color of *amplus* is ochraceous buff, and except in conditions of fresh new pelage there is scarcely any black. The pelage has a peculiar quality about it which baffles description, but which differs to a certain extent in having less gloss or luster than in most

species. In this respect it approaches a similar condition frequently found in specimens of the *melanophrys* type. It is easily distinguished from *melanophrys* by the absence of any definite supraorbital ridge and by its larger audital bullæ. Its relationship to *difficilis* is by no means remote, but its skull differs in the same respects as that of *felipensis*.

Specimens examined.—Total number, 65, from localities in Mexico as follows: *Oaxaca*, Coixtlahuaca, 16, Marques, 5, Tamazulapam, 13; *Puebla*, Chalchicomula, 9; *Tlaxcala*, Apixaco, 2; *Vera Cruz*, Maltrata, 5, Perote, 15.

Peromyscus bullatus sp. nov.

Type from Perote, Vera Cruz, Mexico. Adult female, No. 54,405, U. S. National Museum, Biological Survey Collection, June 3, 1893, E. W. Nelson and E. A. Goldman.

Characters.—Related to *P. truei* and *P. difficilis;* audital bullæ greatly inflated, larger than in any other known species of the genus; external ears very large; tail shorter than head and body.

Color.—Very similar to that of *P. truei*, but richer, more tawny; sides and ground color of upper parts tawny ochraceous; middle of back with considerable dusky producing a broccoli brown effect; top of head and nose broccoli brown; sides of head between base of ear and eye distinctly grayish; a narrow dusky orbital ring; under parts pure creamy white; feet white with a dusky patch on ankle; tail bicolor.

Skull.—Similar in general to that of *P. truei*; smaller than in *P. difficilis;* audital bullæ very much inflated, actually as well as relatively larger than in any other known species of the genus; braincase rounded and somewhat inflated, much as in *truei;* interorbital constriction relatively wider than in *difficilis;* nasals and palatine slits rather long; molar teeth large, actually larger than those of *truei* and nearly equalling those of *difficilis*.

Measurements.—Type: Total length, 200; tail vertebræ, 93 +; hind foot, 23; ear from notch (measured dry), 25. Skull of type: Greatest length, 28.9; basilar length of Hensel, 22; zygomatic width, 14.5; interorbital constriction, 4.5; interparietal, 10 x 3; nasals, 10.4; bony palate, 4.2; palatine slits, 5.8 x 2; diastema, 8.3; postpalatal length, 10; upper molar series, 4.3; greatest diameter of audital bullæ, 6.5.

Remarks.—The relationships of this rather remarkable mouse are clearly with *P. truei* and *P. difficilis*. Its short tail * and light color are sufficient to distinguish it from *difficilis* at a glance, and its enormous audital bullæ separate it at once from *truei*. The external ears are also very large, slightly exceeding those of *difficilis* as well as of all other species. There is only the one specimen in the collection, in spite of the fact that its habitat is in the state of Vera Cruz, where reasonably thorough collecting has been done.

* The tail of the type is not quite perfect, having lost the extreme tip, but it is very evident that it was naturally much shorter than that of *difficilis*.

Peromyscus spicilegus evides subsp. nov.

Type from Juquila, Oaxaca, Mexico. Adult male, No. 71,426, U. S. National Museum, Biological Survey Collection, February 28, 1895, E. W. Nelson and E. A. Goldman.

Characters.—Color as in *spicilegus* except upper side of hind foot, which has a wedge-shaped dusky area extending from ankles nearly to base of toes; skull larger and heavier; teeth much larger.

Color.—Upper parts rich tawny, very slightly mixed with dusky, the dusky somewhat concentrated medially; a narrow black orbital ring and small spot at base of whiskers; under parts creamy white with a small pectoral spot of tawny; tail blackish above, white below; forearm sooty to wrist, hands white; ankle and proximal half of foot sooty except on sides.

Skull.—As in *spicilegus* but larger; molar teeth decidedly heavier.

Measurements.—Average of 5 adult topotypes: Total length, 211; tail vertebræ, 106; hind foot, 25. Skull of type: Greatest length, 29; basilar length of Hensel, 22; zygomatic width, 14.4; interorbital constriction, 4.6; interparietal, 9.3 x 3.2; nasals, 11.5; bony palate, 4.7; palatine slits, 5.6; diastema, 17; postpalatal length, 9.1; upper molar series, 5.

Remarks.—*P. spicilegus* and closely related forms are represented in the Biological Survey Collection by a large number of specimens from nearly all the mountainous parts of Mexico. Among these there is much local and individual variation, and there seems to be no strongly marked tendency to differentiation into forms occupying general areas. The small series from Juquila are markedly larger than *spicilegus*, and this difference in size is emphasized by the skull and teeth. A large series from Los Reyes, Michoacan, appears to be intermediate between *spicilegus* and *evides*.

Peromyscus spicilegus simulus subsp. nov.

Type from San Blas, Tepic, Mexico. Adult male, No. 88,088, U. S. National Museum, Biological Survey Collection, April 18, 1897, E. W. Nelson and E. A. Goldman.

Characters.—Similar in general color to *P. spicilegus;* skull smaller and with decidedly shorter nasals.

Color.—About as in *P. spicilegus;* general color of upper parts cinnamon rufous with a darker dorsal area; under parts white, usually with a small rufous pectoral spot; feet white, ankles dusky; tail usually bicolor, but sometimes not perfectly so.

Skull.—Somewhat similar to that of *spicilegus*, but smaller and more angular; nasals and rostral part of skull decidedly shorter; parietal narrower and less shelf-like; premaxillæ not exceeding nasals; zygomata rather heavy and 'squared' anteriorly; molar teeth very small; bony palate short.

Measurements.—Average of 3 adult topotypes: Total length, 208; tail vertebræ, 111; hind foot, 23. Skull of type: Greatest length, 26.3; basilar length of Hensel, 20.3; zygomatic width, 14; interorbital constriction, 4.1; nasals, 9.4; bony palate, 3.6; palatine slits, 5.6 x 2; diastema, 7; postpalatal length, 9.4; upper molar series, 3.8.

Remarks.—*P. spicilegus* is essentially a mountain animal, and is not usually found except at considerable elevations. Apparently the form from the lowlands of Tepic is its only coast representative. This is well characterized by cranial characters, although it does not differ markedly in color, being possibly a shade darker, but in this respect easily within the variation of the typical form. Specimens from Plomosas, Sinaloa, though referable to *spicilegus*, show some tendency toward *simulus*.

Specimens examined.—Total number, 10, from localities in Mexico, as follows: *Tepic*, Navarrete, 2, Rosario, 2, San Blas, 6.

Peromyscus melanophrys zamoræ subsp. nov.

Type from Zamora, Michoacan, Mexico. Adult male, No. 120,288, U. S. National Museum. Biological Survey Collection, January 20, 1903, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. melanophrys*, but averaging slightly larger and darker; a large tawny pectoral spot present;* skull comparatively broad and heavy, teeth large.

Color.—Similar in general to that of *P. melanophrys*, but apparently somewhat darker, the difference in this respect being very slight if any. Adults with a broad band of tawny across pectoral region between forelegs. Upper side of tail more nearly black than in *melanophrys*.

Skull.—Similar to that of *melanophrys*, but slightly larger and heavier; braincase fuller and broader; audital bullæ larger; supraorbital beads less trenchant and forming ridges rather than shelves anteriorly; molar teeth larger; other characters similar.

Measurements.—Type: Total length, 260; tail vertebræ, 141; hind foot, 29. Average of 7 young adult topotypes: Total length, 259; tail vertebræ, 144; hind foot, 28.4. Skull.—Two adults: Greatest length, 31.3–32; basilar length of Hensel, 25–25.9; zygomatic width, 16.5–16.9; nasals, 12–12; upper molar series, 4.7–4.8; palatine slits, 6.6 x 2.7–7 x 2.6.

Remarks.—All the adult specimens of this form thus far examined have the tawny pectoral marking highly developed. The majority of the series from Zamora are adolescents and exceptionally dark. Even those

* The constancy of this character may be doubted, as it is of such irregular occurrence in this genus. In the present case, while not diagnostic, it seems to be a character of importance. Of 76 specimens of *melanophrys* and *consobrinus*, 4 only have pectoral spots, and these are small and indistinct. Of 19 typical specimens of *zamoræ*, all have well-marked pectoral spots except 2 plumbeous young, which have only traces.

that have not passed beyond the plumbeous juvenile pelage are decidedly darker than comparable specimens of typical *melanophrys*. Two adults, however, show only very slightly darker shades than *melanophrys*. Specimens from Zimapan, Hidalgo, are questionably referred to this form, but in cranial characters they approach *consobrinus*. Four specimens from Querendaro seem to be typical *zamoræ*.

Specimens examined.—Total number, 43, from localities in Mexico as follows: *Hidalgo*, Zimapan, 24 (aberrant); *Michoacan*, Querendaro, 4; Zamora, 15.

Peromyscus melanophrys consobrinus subsp. nov.

Type from Berriozabal, Zacatecas, Mexico. Adult female, No. 79,626, U. S. National Museum, Biological Survey Collection, July 10, 1896, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. melanophrys*, but tail slightly shorter; skull with larger audital bullæ and other slight peculiarities.

Geographic distribution.—Southern part of Mexican tableland in the Sonoran zone.

Color.—As in *melanophrys*. Topotype No. 58,028, in full winter pelage (Dec.), has the upper parts and sides tawny ochraceous thickly lined with black to the edge of a narrow tawny lateral line; orbital ring black, sharply contrasting with a grayish area about it which extends from the base of the whiskers around the eye to the anterior base of the ear; under parts creamy white with a very small tawny pectoral spot; tail bicolor, white below, dusky above; feet creamy white, ankles dusky.

Skull.—Similar to that of *melanophrys* but somewhat shorter; nasals shorter and slightly broader; audital bullæ larger; braincase more bulging and less elongate.

Measurements.—Type: Total length, 250; tail vertebræ, 131; hind foot, 26.5. Average of 5 adult topotypes: Total length, 256; tail vertebræ, 135; hind foot, 27.5. Skull of type: Greatest length, 30.8; basilar length of Hensel, 25.3; zygomatic width, 16.3; interorbital constriction, 4.9; nasals, 11.1; upper molar series, 4.7; palatine slits, 6.6 x 2.5; bony palate, 4.4.

Remarks.—This is not a strongly marked subspecies, but its characters, such as they are, have great constancy throughout its range. It is apparently the form of the Mexican tableland, but its distribution may be continuous with that of *zamoræ* and thence with true *melanophrys*. Specimens from Zimapan, Hidalgo, appear to approach *consobrinus* in cranial characters but retain the coloration of *zamoræ*.

Specimens examined.—Total number 22 from localities in Mexico as follows: *Aguas Calientes*, Chicalote, 1; *Guanajuato*, Silao, 3; *Jalisco*, Colotlan, 1; *San Luis Potosi*, Ahualulco, 1, Hacienda La Parada, 3; *Zacatecas*, Berriozabal, 12, Monte Escobedo, 1.

Peromyscus xenurus sp. nov.

Type from Durango, Durango, Mexico. Adult female, No. 94,518, U. S. National Museum, Biological Survey Collection, July 1, 1898, E. W. Nelson and E. A. Goldman.

Characters.—Similar in size and proportions to *P. melanophrys;* ground color more nearly fawn than tawny; pectoral spot well developed; tail black except a narrow ventral line of white; hind feet clouded with dusky.

Color.—Type, in fresh pelage except on rump: Ground color of upper parts grayish fawn color, gradually becoming more grayish anteriorly, so that with the strong mixture of black through it all the effect from the middle of the back forward passes from mixed fawn color through drab to hair brown; the rump, which is still in worn pelage, is fawn color; lower cheeks bright fawn color blending with gray, which covers most of the face from the base of the ears forward to the nose; under parts white except patch of bright fawn color extending from bases of forelegs across breast; hind feet clouded with dusky brown to base of toes, which are creamy white; tail black all around except a narrow stripe of white on the under side occupying scarcely more than one-fifth of the entire surface of the tail except distally, where, the diameter of the tail being very slight, it nearly covers the under side.

Skull.—Similar in general to that of *P. m. consobrinus;* nasals noticeably shorter; anterior palatine foramina shorter; postpalatal notch shorter and wider.

Measurements.—The type and one adult topotype: Total length, 246–248; tail vertebræ, 142–140; hind foot, 28–28. Skull: Greatest length, 30 basilar length of Hensel, 23.8; zygomatic width, 115.5; interorbital width, 4.9; nasals, 10.2; upper molar series, 4.9; palatine slits, 5.7 x 2.3.

Remarks.—This species is easily distinguished from any other of the *melanophrys* group by the combination of large pectoral spot, dusky hind feet, and peculiar tail with only a narrow line of white on the under side instead of the usual equal division of the light and dark. It is the northernmost form of the *melanophrys* group, and at present is only known from two specimens from one locality, so there is doubtless much to be learned in regard to its distribution.

Peromyscus zelotes sp. nov.

Type from Querendaro, Michoacan, Mexico. Old female, No. 50,430, U. S. National Museum, Biological Survey Collection, August 8, 1892, E. W. Nelson.

Characters.—Size about the same as *P. levipes* (hind foot, 23); tail slightly longer than head and body; ears relatively about same size as in *melanophrys;* color almost exactly as in *P. melanophrys;* skull similar in general to that of *P. melanophrys* but much smaller.

Color.—Similar to that of *P. melanophrys*, but facial region more suffused with tawny and the gray very much reduced; somewhat similar to *P. levipes* but paler throughout; no trace of a pectoral spot.

Skull.—Similar in general to that of *P. melanophrys* but much smaller; audital bullæ slightly smaller; nasals shorter, interorbital space relatively wider; supraorbital beads obsolete; postpalatal notch narrow.

Measurements.—Type (old ♀): Total length, 218; tail vertebræ, 115; hind foot, 23. Skull: Greatest length, 28.3; basilar length of Hensel, 21.6; zygomatic width, 14.2; interorbital width, 4.9; nasals, 10.6; upper molar series, 4.6; palatine slits, 5.6 x 2.4.

Remarks.—This species appears to be closely related cranially to *P. melanophrys*, but differs markedly from the other forms of the group in its small feet and short tail. It requires no serious comparison with *P. levipes*, which has a widely different skull, with low shallow braincase, posteriorly compressed nasals, small bullæ, etc. Besides three from the type locality, one rather imperfect specimen from Tula, Hidalgo, seems referable to *zelotes*. It is somewhat brighter colored and differs slightly in cranial characters.

Peromyscus banderanus vicinior subsp. nov.

Type from La Salada, Michoacan, Mexico. Adult male, No. 126,503, U. S. National Museum, Biological Survey Collection, March 23, 1903, E. W. Nelson and E. A. Goldman.

Distribution.—Known from three localities in the State of Michoacan to the eastward of the range of typical *P. banderanus*.

Characters.—Darker than *P. banderanus;* skull narrower and anterior palatine foramina differently shaped; otherwise similar.

Color.—Slightly darker and more vinaceous than in *banderanus* in worn or summer pelage; decidedly darker in winter pelage, with a definite dusky median dorsal area; markings about eyes, whiskers, and ankles, sooty black instead of brown as in *banderanus;* upper side of tail sooty instead of brownish.

Skull.—Similar to that of *banderanus*, but braincase averaging slightly narrower; anterior palatine foramina more nearly elliptical, being widest in the middle and narrowing toward each end.

Measurements.—Type: Total length, 216; tail vertebræ, 107; hind foot, 27. Average of 3 young adults from La Huacana, Michoacan, 233; 117; 24.5. Skulls of two adults: * Greatest length, 31–32; basilar length of Hensel, 23.3–24.1; zygomatic width, 14.3–14; interorbital width, 5–4.8; nasals, 11.8–12.4; interparietal, 3.7 x 10.2–4.5 x 10.2; upper molar series, 4.6–4.4; palatine slits, 6 x 2.3–5.8 x 2.3.

Remarks.—This is an interior form of *banderanus*, only slightly characterized but not entirely negligible. Two specimens taken in February at Los Reyes, Michoacan, present the fullest and newest pelage and show a

* Measurements mentioned first are those of the type.

considerable departure from typical *banderanus*. The small series from La Salada have uniformly narrow skulls, noticeably narrower than in *banderanus*, but specimens from Los Reyes and La Huacana indicate that this is not a stable character. It seems, however, to be worth mentioning.

Specimens examined.—Total number, 15, from localities in Mexico as follows: *Guerrero*, Acahuizotla, 3; *Michoacan*, La Huacana, 4, La Salada, 6, Los Reyes, 2.

Peromyscus banderanus angelensis sp. nov.

Type from Puerto Angel, Oaxaca, Mexico. Adult female, No. 71,442, U. S. National Museum, Biological Survey Collection, March 13, 1895, E. W. Nelson and E. A. Goldman.

Characters.—Similar to typical *P. banderanus*, but slightly larger; skull with supraorbital bead nearly obsolete instead of being well developed.

Color.—Almost exactly as in *P. banderanus;* possibly averaging a trifle darker.

Skull.—Larger than in *banderanus;* braincase less elongate and interparietal shorter; nasals longer; supraorbital edges reduced to simple shelves, much as in *P. melanophrys*, without an elevated bead bounded by a sulcus on the inner side; molar teeth slightly larger than in *banderanus;* audital bullæ about as in *banderanus* and *aztecus*, much smaller than in *melanophrys*.

Measurements.—Type: Total length, 235; tail vertebræ, 123; hind foot, 26.5. Average of 7 adult topotypes, 235 (222–258); 120 (112–128); 27 (26.5–28). Skull.—Two adults: Greatest length, 31.3*–33.4; basilar length of Hensel, 23.4–24.9; zygomatic width, 15–15.4; interorbital width, 5.2–5; nasals, 11.7–12.8; interparietal, 3.6 x 10.6–3.4 x 11.2; upper molar series, 4.6–4.6; palatine slits, 6 x 2.4–5.7 x 2.4.

Remarks.—The naked soles of this form decide its affinities with *banderanus*, and its color is also in accord, but its skull with the supraorbital beads nearly obliterated suggests that of *P. aztecus*. Close examination of detailed characters of the skull, however, leaves scarcely any room for doubt that its proper position is with *banderanus*.

Specimens examined.—Total number, 22; 20 from the type locality and 2 from Pluma, Oaxaca.

Peromyscus mexicanus teapensis subsp. nov.

Type from Teapa, Tabasco, Mexico. Adult female, No. 100,022, U. S. National Museum, Biological Survey Collection, March 25, 1900, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. m. totontepecus*, but sides brighter and more contrasted with dark area in middle of back; skull with thicker, heavier rostral region.

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* Measurements mentioned first are those of the type.

Color.—Type: Sides rich chestnut shading into a well-defined blackish area in median dorsal region; a narrow black orbital ring and spot at base of whiskers; under parts slate color overlaid with creamy white (no pectoral spot in type, but of frequent occurrence among series of topotypes); tail black except a few irregular spots of yellowish white on under side; fore feet white; hind feet white except a dark brown area extending, and decreasing in width, from ankles down nearly to base of toes.

Skull.—Similar to that of *totontepecus*, but with broader nasals and generally heavier and more thickened rostral region; anterior palatine foramina usually wider; infraorbital part of zygoma rather heavier than in *totontepecus*, but not squarely 'elbowed' as in *mexicanus;* teeth about as in *totontepecus*, wider and heavier than in *mexicanus.*

Measurements.—Average of 10 adults from the type locality: Total length, 245 (234–254); tail vertebræ, 129 (121–136); hind foot, 28 (27–28.5). Skull of type: Greatest length, 33; basilar length of Hensel, 24.6; zygomatic width, 16.2; nasals, 12.7; interorbital constriction, 5.4; palatine slits, 6 x 2.9; upper molar series, 4.5; bony palate, 4.7; diastema, 8.2; postpalatal length, 11.9.

Remarks.—Represented by a series of 17 specimens containing a good percentage of adults and showing very little variation. Two specimens from Montecristo, Tabasco, are decidedly paler, much as in true *mexicanus.* The form is not strongly marked, but ranks well with the others of the same group, which is a difficult one. The vicinity of Teapa, visited by Nelson and Goldman in the spring of 1900, is already well known for the dark, rich color of the animals found there. The present subspecies is no exception.

Peromyscus yucatanicus badius subsp. nov.

Type from Apazote, Campeche, Mexico. Adult female, No. 108,016, U. S. National Museum, Biological Survey Collection, December 28, 1900, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. yucatanicus* but darker colored.

Color.—Decidedly darker than *P. yucatanicus*, having a median dorsal area with a strong admixture of black and more or less black on the sides except a narrow lateral line which is cinnamon rufous like the general ground color; under parts faintly suffused with yellow; a narrow black orbital ring; hairs of tail blackish brown above, white below; under side of tail beneath hairs chiefly yellowish white, but somewhat irregularly blotched with dusky; feet white.

Skull.—As in *P. yucatanicus.*

Measurements.—Average of 10 topotypes: Total length, 193.4; tail vertebræ, 96.7; hind foot, 23.5. Skull of type: Greatest length, 28.2; basilar length of Hensel, 20.7; zygomatic width, 14.1; interorbital constriction, 4.7; interparietal, 9.2 x 3.1; nasals, 10.4; bony palate, 4.2;

palatine slits, 5.3 x 2.2; diastema, 7; postpalatal length, 9.9; upper molar series, 4.1.

Remarks.—This slight form doubtless owes its dark color to its habitat in a more humid region than that of true *yucatanicus*. Its range is probably limited to the region of the base of the peninsula of Yucatan, as its nearest relatives known from west of that region are the larger and quite different forms of the *mexicanus* group.

Specimens examined.—Total number 19, all from the type locality.

Peromyscus allophylus sp. nov.

Type from Huehuetan, Chiapas, Mexico. Adult female, No. 77,657, U. S. National Museum, Biological Survey Collection, February 21, 1896, E. W. Nelson and E. A. Goldman.

Characters.—Size medium (hind foot 25); tail shorter than head and body; ears moderate, scantily haired; coloration dark; tail dusky blackish, unicolor, covered with small imbricate scales, much as in *Oryzomys;* proximal third of soles of hind feet finely haired; skull rather long and narrow; teeth very small.

Color.—Sides mummy brown, deepening toward middle of back, causing a rather distinct median dorsal line of blackish brown; under parts yellowish white over slate-color, the latter showing through; tail dusky blackish, unicolor; a black orbital ring and antorbital spot; feet whitish, scantily haired; ankles dusky.

Skull.—Rather long and narrow; braincase elevated; infraorbital notch scarcely evident; nasals rather short, slightly exceeded by premaxillæ; no supraorbital ridge; palatine foramina rather large, longer than bony palate; audital bullæ small, smaller than in *aztecus* or *mexicanus;* molar teeth very small; interparietal small.

Measurements.—Type: Total length, 202; tail vertebræ, 95; hind foot, 25. Skull: Greatest length, 29.8; basilar length of Hensel, 22.5; zygomatic width, 14.5; interorbital constriction, 5; nasals, 11; bony palate, 4; palatine slits, 6 x 2.4; diastema, 8.2; postpalatal length, 10.5; upper molar series, 4.

Remarks.—It is difficult to be certain what are the affinities of this peculiar species. But for the size of its ears and shortness of its tail, it might well pass for an *Oryzomys* of the *O. chapmani* group. Its dark, scaly tail immediately suggests *Oryzomys*, and the character and color of its pelage bear out the resemblance. Its skull, however, is that of an ordinary type of *Peromyscus* without any striking characters. It seems probable that its closest relationship is with the *mexicanus* group, though it might easily be a northern member of some Central American group not yet known. It agrees in some respects with the description of *P. gymnotis* Thomas, from Guatemala. Another species from southern Chiapas agrees with this description much more closely, however, and for present purposes has been assumed to be identical with true *gymnotis*.

Peromyscus lophurus sp. nov.

Type from Todos Santos, Guatemala. Adult male, No. 77,219, U. S. National Museum, Biological Survey Collection, December 30, 1895, E. W. Nelson and E. A. Goldman.

Characters.—Most similar to *P. lepturus*, but smaller and paler; tail long and covered with comparatively long soft hairs, and terminating in a distinct pencil; pelage soft and 'woolly' and rather dull and lusterless; skull with large interparietal and short nasals.

Color.—Type: General effect of upper parts between wood brown and fawn color, with a small dusky area in middle of back; lateral line pale ochraceous buff; under parts white; no pectoral spot; tail sepia brown, unicolor; forearm dusky to wrist, fore feet white; hind feet dusky brownish to base of toes; toes white; orbital ring dusky black, rather narrow, but expanded into a distinct spot in front of eye.

Skull.—Similar to that of *lepturus*, but smaller and with rostral part decidedly shorter; molar teeth actually about same size, relatively larger; interparietal very large. Compared to that of *P. levipes*, the skull of *lophurus* is shorter, with shorter nasals and heavier infraorbital region; the teeth are decidedly heavier and longer and the interparietal larger.

Measurements.—Average of 4 adult topotypes: Total length, 208; tail vertebræ, 105; hind foot, 24.5; ear from notch, 16. Skull of type: Greatest length, 27.5; basilar length of Hensel, 20.8; zygomatic width, 14.7; interorbital constriction, 4.3; interparietal, 10 x 4.5; nasals, 10; bony palate, 4; palatine slits, 5.4 x 2; diastema, 6.5; postpalatal length, 9.6; upper molar series, 4.7.

Remarks.—This very distinct species may be easily recognized by its crested tail and usually by the absence of white on the under side of the tail. All the specimens from Todos Santos have unicolor tails, but 2 from Calel are quite distinctly bicolor, and among 4 from San Cristobal, 2 have unicolor and 2 imperfectly bicolor tails, indicating that this character is not invariable. The character of the pelage differs somewhat from most of the smaller species of *Peromyscus* in being dull and soft without the usual gloss, and although rather short it is fine and slightly 'woolly.'

Specimens examined.—Total number, 15, from localities as follows: Pinabete, Chiapas, Mexico, 5; San Cristobal, Chiapas, Mexico, 4; Calel, Guatemala, 2; Todos Santos, Guatemala, 6.

Peromyscus simulatus sp. nov.

Type from Jico, Vera Cruz, Mexico (altitude 6000 feet). No. 55,028, U. S. National Museum, Biological Survey Collection, July 12, 1893, E. W. Nelson.

Characters.—A miniature of *P. lophurus* (hind foot 21); dark markings lightly more intense; skull and teeth very small; tail clothed with long, soft hairs and crested as in *lophurus;* audital bullæ relatively large.

Color.—Almost exactly as in *P. lophurus;* dark markings of feet and face slightly more intense; tail chiefly brown, but with a narrow line of white on under side.

Skull.—Size very small; similar in general to that of *P. lophurus,* but with more inflated braincase and depressed rostrum; audital bullæ relatively larger; interorbital constriction relatively wider; teeth very small.

Measurements.—Type: Total length, 169; tail vertebræ, 87; hind foot, 21; ear from notch, 14.3. Skull: Greatest length, 24.4; basilar length of Hensel, 18; zygomatic width, 12.5; interorbital constriction, 4.3; interparietal, 8.2 x 3; nasals, 9; bony palate, 3.5; palatine slits, 4.6 x 1.7; diastema, 6; postpalatal length, 8; upper molar series, 8.9.

Remarks.—This small species is not closely related to any known species except *P. lophurus,* of which it is almost an exact miniature. Its skull is even smaller than that of *P. melanotis,* which occurs in the same region. It has, however, no relationship whatever to *melanotis.* Its small size, crested tail, and dark brown feet are amply sufficient to distinguish it from all other known species.

Peromyscus melanocarpus sp. nov.

Type from Mount Zempoaltepec, Oaxaca, Mexico (altitude 8000 feet). Young adult, No. 68,610, U. S. National Museum, Biological Survey Collection, July 8, 1894, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. megalops,* but smaller and darker colored; hind feet slightly darker; fore feet decidedly more so, the blackish extending to base of digits; tail usually dusky all around or with only traces of paleness beneath; pelage long and soft.

Color.—Ad. ♂ No. 68,627, July 17: General effect of upper parts dark blackish mummy brown, slightly darker along middle of back; actual color of subterminal zone of hairs cinnamon rufous, which is almost lost in the general effect by the many black-tipped hairs and the dark plumbeous undercolor which shows through the thin subterminal zone; under parts deep blackish slate washed with creamy white, producing an effect which varies from olive gray to slate gray; pectoral region usually rich cinnamon rufous; an intense black line extending from nostrils through base of whiskers and eye; tail covered with short, bristly, blackish hairs scarcely paler below than above; scales of tail usually dusky all around, sometimes with slight irregular patches of paler; fore and hind feet dusky brownish to base of toes.

Skull.—Apparently very similar to that of *megalops;* nasals slightly shorter and more compressed posteriorly; superficially similar to *totontepecus,* but differing as follows: nasals shorter and nearly always ending in advance of the orbits about on a plane with the infraorbital foramen; frontal wider and with decidedly greater development of supraorbital shelves; braincase wider; anterior palatine foramina much longer; molar teeth larger.

Measurements.—Type (not quite adult): Total length, 241; tail vertebræ, 125; hind foot, 27. Ad. ♂ from Totontepec, Oaxaca: 262; 132; 30. Skull of type: Greatest length, 31.6; basilar length of Hensel, 24.3; zygomatic width, 15.2; nasals, 12; interorbital constriction, 5.4; palatine slits, 7.3; upper molar series, 5.

Remarks.—This mountain species is about the size of *P. m. totontepecus*, with which it ranges to some extent, but is much more closely related to *megalops* and *auritus*, as indicated by its cranial characters and its more bristly tail. Its most diagnostic character, however, is the extent of dusky brownish on the fore feet, which is almost unique. In some specimens the ends of the toes and the outer side of the metacarpus are the only parts not occupied by the dark color. The pelage is long and lax like that of many other mountain forms. The type was taken at 8000 feet altitude. Five additional specimens from Totontepec on the north slope of the same mountain at 6500 feet altitude are also in the collection. *P. lepturus*, which also occurs on Mt. Zempoaltepec, is smaller than *melanocarpus* and differs in numerous cranial characters, among the most obvious of which are: Braincase smaller and narrower, interorbital constriction narrower, nasals shorter, supraorbital beads less developed.

Peromyscus altilaneus sp. nov.

Type from Todos Santos, Guatemala (altitude 10,000 feet). Adult male, No. 76,856, U. S. National Museum, Biological Survey Collection, December 30, 1895, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. melanocarpus*, but smaller and with shorter and less hairy tail; fore feet entirely white; hind feet with much more white than in *melanocarpus;* skull slightly smaller and more slender; similar to *guatemalensis* but much smaller.

Color.—As in *melanocarpus*, but tail blotched with yellowish white below, much as in *mexicanus;* fore feet and part of forearm white; hind foot with a V-shaped dusky mark extending from ankle about half way to the base of the toes, remainder of foot white; pectoral spot strongly developed in type.

Skull.—Similar to that of *melanocarpus*, but slightly smaller throughout; nasals relatively more expanded anteriorly; braincase slightly higher and more inflated and rostral region more depressed; anterior palatine foramina shorter; infraorbital plate very narrow.

Measurements.—Type: Total length, 228; tail vertebræ, 115; hind foot, 28. Skull: Greatest length, 31; basilar length of Hensel, 24; zygomatic width, 14.6; interorbital constriction, 5; nasals, 11.5; bony palate, 4.8; palatine slits, 6 x 2.7; diastema, 8.2; postpalatal length, 11.2; upper molar series, 4.6.

Remarks.—The type of this species is the only specimen known at present. Its only close relationship is with *P. melanocarpus*, to which it is very similar except in regard to the color of the wrists and fore feet. From *P. lepturus* it differs in darker color, strongly developed pectoral

spot, shorter, less hairy tail, and in the following cranial characters: Parietals larger and wider, with suggestions of a bead at orbital edges; braincase more inflated; infraorbital plate much narrower; audital bullæ smaller; teeth smaller. It resembles *guatemalensis* superficially, but is so decidedly smaller as to require no serious comparison with that species.

Subgenus **Haplomylomys** Osgood.

Peromyscus goldmani sp. nov.

Type from Alamos, Sonora, Mexico. Adult female, No. 96,340, U. S. National Museum, Biological Survey Collection, December 19, 1898, E. A. Goldman.

Characters.—Similar in general to *P. eremicus anthonyi;* size larger (hind foot 24 in type); pelage somewhat coarser; color more fulvous and more uniform; heel slightly hairy; tail long and cylindrical, covered with short hairs; skull relatively heavy and rather elongate.

Color.—Entire upper parts and sides ochraceous buff finely mixed with black, much darker and richer than in *anthonyi* and without the grayish cast usually so characteristic of the *eremicus* group; under parts creamy white with a small ochraceous buff pectoral spot.

Skull.—Larger, longer, and narrower than in *eremicus* or *anthonyi*; braincase relatively much narrower; nasals longer and more compressed posteriorly; interorbital constriction narrow; bony palate rather short.

Measurements.—Type: Total length, 217; tail vertebræ, 117; hind foot, 24. Skull of type: Greatest length, 27.3; basilar length of Hensel, 21.1; zygomatic width, 14.2; interorbital constriction, 4; interparietal, 8.6 x 3.2; nasals, 9.6; bony palate, 4.2; palatine slits, 5 x 2.1; diastema, 6.6; postpalatal length, 10; upper molar series, 4.

Remarks.—The color of this species is more like that of *P. spicilegus* than *P. e. anthonyi*, but its skull and teeth show it to be a member of the *eremicus* group.

Peromyscus eremicus phæurus subsp. nov.

Type from Hacienda La Parada, San Luis Potosi, Mexico. Adult female, No. 50,438, U. S. National Museum, Biological Survey Collection, August 20, 1892, E. W. Nelson.

Geographic distribution.—Middle portion of the Mexican tableland in the States of San Luis Potosi, Zacatecas, and Nuevo Leon.

General characters.—Similar to *P. eremicus* but darker, with tail uniform blackish brown above and below instead of decidedly bicolor as in *eremicus* or indistinctly bicolor as in some specimens of *P. e. anthonyi.*

Color.—Similar in general to *eremicus*, but shades of buff deeper and entire upper parts much more heavily mixed with black; under parts except tail white; pectoral spot not present; tail blackish brown above and below, this most evident in winter pelage, when the hairiness of the tail is best developed; feet white, ankles dusky.

Skull.—Practically as in *eremicus* and *anthonyi*.

Measurements.—Average of 9 adults: Total length, 189 (176–195); tail vertebræ, 98 (92–103); hind foot, 21.

Remarks.—This form is the southernmost representative of the *eremicus* group. Its range is practically continuous with that of *eremicus*, which extends from west Texas down through Chihuahua, but it is cut off by mountain ranges from *anthonyi*, which, curiously, it most closely resembles. The extreme form of *anthonyi* from southern Sonora occasionally has the distal third of the tail black all around, and thus very much resembles *phæurus*. This is probably an accidental parallelism, as is also shown by some specimens of *fraterculus* which are strikingly like *anthonyi*, although there is even greater isolation in this case.

Specimens examined.—Total number, 27, from localities in Mexico, as follows: *Coahuila*, Sabinas 2, Saltillo 2; *San Luis Potosi*, Ahualulco, 2, Hacienda la Parada, 7, Jesus Maria, 7; *Nuevo Leon*, Doctor Arroyo, 5; *Zacatecas*, Canitas, 2.

Subgenus **Baiomys** True.

Peromyscus musculus nigrescens subsp. nov.

Type from Valley of Comitan, Chiapas, Mexico. Adult female, No. 76,827, U. S. National Museum, Biological Survey Collection, December 9, 1895, E. W. Nelson and E. A. Goldman.

Characters.—Similar to *P. musculus* and *P. m. brunneus*, but darker and more sooty; skull slightly characterized.

Color.—Upper parts mixed vandyke brown and sooty blackish, slightly more sooty on middle of back; under parts cream buff, to roots of hairs in middle of belly, on tips only at sides; tail dusky above, paler below.

Skull.—Slightly smaller and more elongate than in *P. musculus* and *P. m. brunneus;* braincase narrower; rostrum longer; palatine slits longer and bony palate correspondingly shorter; interorbital space narrower.

Measurements.—Average of 10 adult topotypes: Total length, 115.5 (113–120); tail vertebræ, 43 (40–45); hind foot, 15 (14.5–16). Skull of type: Greatest length, 20.1; basilar length of Hensel, 15.2; zygomatic width, 10.5; interorbital constriction, 3.4; nasals, 8; interparietal, 6.4 x 2.1; palatine slits, 4.3; bony palate, 2.8; upper molar series, 3.2.

Remarks.—This very dark colored mouse is represented by large numbers of specimens from southern Oaxaca, Chiapas, and parts of Guatemala.

Peromyscus allex sp. nov.

Type from Colima, Colima, Mexico. Adult female, No. $\frac{3}{4}\frac{3}{5}\frac{4}{4}\frac{2}{5}\frac{9}{2}$, U. S. National Museum, Biological Survey Collection, March 7, 1892, E. W. Nelson.

Characters.—Color as in *P. musculus;* size decidedly smaller; skull small, light, and slender.

Color.—Exactly as in *P. musculus*.

Skull.—About equal in size to that of *P. taylori;* braincase narrower and more elongate; decidedly smaller than in *P. musculus:* nasals very short; andital bullæ very small; molar teeth small.

Measurements.—Type: Total length, 113; tail vertebræ, 47; hind foot, 14; ear from notch (dry), 9.7. Average of 6 topotypes: 104; 44; 13.4. Skull of type: Greatest length, 18.4; basilar length of Hensel, 14.6; zygomatic width, 9.6; interorbital constriction, 3.2; nasals, 6.3; interparietal, 5.5 x 1.3; palatine slits, 3.7; bony palate, 3; upper molar series, 3.

Remarks.—This diminutive species occurs with *P. musculus* at Colima, the type locality, and at other localities in western Mexico. It is represented chiefly from the States of Colima and Jalisco, but its range has not been thoroughly worked out and it seems quite possible that it may be found over a considerable area. Apparently it is closely related to *P. paulus,** the description of which indicates an animal of about the same size but of different color.

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*Allen, Bull. Am. Mus. Nat. Hist., XIX, pp. 598–599, November 12, 1903.

Vol. XVII, pp. 79-82 March 21, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF FIVE NEW MAMMALS FROM MEXICO.

BY E. A. GOLDMAN.

The mammals described below were collected by E. W. Nelson and myself in the course of field work for the Biological Survey in southern Mexico. The wood rats all belong to the *ferruginea** group, of which *Neotoma tenuicauda* is also a member. The *Liomys* is an additional species of the *pictus* group. For the opportunity to describe these new forms I am indebted to Dr. C. Hart Merriam, under whose supervision the field work has been carried on.

Neotoma picta sp. nov.

Type from mountains near Chilpancingo, Guerrero, Mexico (altitude, 10,000 feet). Adult male, No. 70,050, U. S. National Museum, Biological Survey Collection, December 20, 1894, E. W. Nelson and E. A. Goldman. Original number 7179.

Characters.—Size medium; color rich orange-rufous to ferruginous of Ridgway; tail long and slender, covered with short hairs; ears rather small. Closely related to *N. tenuicauda* but slightly larger; color very much brighter. Somewhat similar to *N. ferruginea*, but smaller and brighter colored; outer sides of forearms and hind legs not dusky as in *N. ferruginea*.

Color.—Type: Ground color of upper parts rich orange-rufous (varying in some specimens to ferruginous) of Ridgway, brightest on cheeks, shoulders, and along sides, darkened on face, top of head, and along back

*Specimens from Volcan Santa Maria, Guatemala, which agree well with the original description of *Neotoma ferruginea*, have been assumed to be nearly typical and used for comparison.

by a rather abundant sprinkling of black-tipped hairs; under parts nearly pure white (in some specimens suffused with salmon), the plumbeous basal color showing through indistinctly; axillæ orange-rufous; ears covered with short dusky hairs; tail indistinctly bicolor (occasionally concolor), dusky above, paler below; fore feet yellowish white; hind feet to toes irregularly clouded with dusky or pale fulvous, the toes white.

Skull.—The skull indicates close relationship to *N. tenuicauda*, but is slightly larger and the nasals are longer. Compared with *N. ferruginea*, the skull is smaller, with narrower frontal region.

Measurements.—Type: Total length, 368; tail vertebræ, 180; hind foot, 37. Average of eight adult females from the type locality: Total length, 344 (338–355); tail vertebræ, 170 (166–182); hind foot, 34 (33–35.5). Skull of type: Greatest length, 43.3; basilar length of Hensel, 35; zygomatic breadth, 23; length of nasals, 17.4; interorbital breadth, 5; palatal length, 8.6; diastema, 11.9; upper molar series on alveolus, 8.7.

Specimens examined.—Total number, 31, all from the State of Guerrero, as follows: Mountains near Chilpancingo (type locality), 16; Omilteme, 15.

Remarks.—*Neotoma picta* appears to be more closely related to *N. tenuicauda* than to any other known form, but its remarkable color is alone sufficient to distinguish it from that species.

Neotoma isthmica sp. nov.

Type from Huilotepec, 8 miles south of Tehuantepec, Oaxaca, Mexico (altitude, 100 feet). Adult female, No. 73,187, U. S. National Museum, Biological Survey Collection, May 5, 1895, E. W. Nelson and E. A. Goldman. Original number 7843.

Characters.—Size rather large; color orange-rufous to ferruginous; tail long, moderately stout, thinly haired and coarsely scaly; ears medium. Similar to *N. ferruginea*, but much brighter colored and without dusky forearms and hind legs; skull narrower and heavier. In color closely resembling *N. picta*, but larger, with stouter, more coarsely scaly tail, and differing in cranial characters.

Color.—Type (in worn pelage): Upper parts in general between orange-rufous and ferruginous of Ridgway, fading to grayish fulvous on outer sides of forearms and hind legs; face, top of head, and back thinly sprinkled with blackish hairs; under parts, including upper lip, lower sides of face, and inner sides of fore and hind legs, soiled white; tail indistinctly bicolor, brownish above, paler below; fore feet pure white; hind feet to toes clouded with dusky (in some specimens pure white), the toes white.

Skull.—Similar to that of *N. ferruginea* but narrower, heavier, and more arched across anterior roots of zygomata. Compared with *N. picta* the skull is larger, longer, heavier, relatively narrower, and more arched across anterior roots of zygomata; frontal region flatter posteriorly; braincase less smoothly rounded.

Measurements.—Type: Total length, 395; tail vertebræ, 198; hind foot, 38. Average of nine adult males and females from the type locality:

Total length, 368 (355–390); tail vertebræ, 182 (166–198); hind foot, 37 (35–39). Skull of type: Greatest length, 48.4; basilar length of Hensel, 38.4; zygomatic breadth, 23.7; length of nasals, 19; interorbital breadth, 6.2; palatal length, 8.3; diastema, 12.9; upper molar series on alveolus, 9.

Specimens examined.—Total number, 19, all from the state of Oaxaca, as follows: Huilotepec (type locality), 16; Juchitan, 3.

Neotoma parvidens sp. nov.

Type from Juquila, Oaxaca, Mexico (altitude, 5000 feet). Adult female, No. 71,586, U. S. National Museum, Biological Survey Collection, February 27, 1895, E. W. Nelson and E. A. Goldman. Original number 7587.

Characters.—Size very small; color ferruginous; tail rather short and slender, covered with short hairs; ears small. Closely resembling *N. picta* in color but very much smaller; skull smaller and lighter, with narrower nasals and smaller teeth.

Color.—Upper parts ferruginous (varying along sides in some specimens to orange-rufous) of Ridgway, becoming brownish fulvous over outer sides of forearms and hind legs; face, top of head, and back (in some specimens the sides also) rather thickly sprinkled with black-tipped hairs; underparts, including upper lip and part of cheeks, nearly pure white, the plumbeous basal color showing through indistinctly; axillæ orange-rufous; ears covered with short dusky hairs; tail dusky above, paler below; fore feet and toes of hind feet yellowish white; hind feet to toes irregularly clouded with dusky (in two out of five specimens, pure white).

Skull.—Similar in general form to that of *N. tenuicauda*, but smaller, lighter, and usually more arched; interorbital breadth relatively greater; rostrum usually more decurved, nasals narrower and more wedge-shaped; teeth relatively much smaller.

Measurements.—Type: Total length, 295; tail vertebræ, 141; hind foot, 31. Average of five adult males and females from the type locality: Total length 300 (282–317); tail vertebræ, 149 (141–157); hind foot, 31 (30–32). Skull of type: Greatest length, 40.5; basilar length of Hensel, 32.5; zygomatic breadth, 20.7; length of nasals, 15.2; interorbital breadth, 5.3; palatal length, 7.3; diastema, 11.3; upper molar series on alveolus, 7.4.

Specimens examined.—Five, all from the type locality.

Neotoma tropicalis sp. nov.

Type from Totontepec, Oaxaca, Mexico (altitude, 6500 feet). Adult male No. 68,593, U. S. National Museum, Biological Survey Collection, July 17, 1894, E. W. Nelson and E. A. Goldman. Original number 6468.

Characters.—Size small; tail rather short, slender, and thinly haired; ears rather small. In color closely resembling *N. tenuicauda* but brownish of upper parts encroaching on under parts; skull somewhat similar

to that of *N. tenuicauda*, but nasals longer and narrower and premaxillæ longer.

Color.—Upper parts dark brown, becoming brownish fulvous on cheeks, shoulders, and along sides, this color encroaching on under parts posteriorly, leaving a narrow, whitish area along the median line of the belly; rest of under parts, except a salmon colored band across pectoral region in the type, dull whitish (the plumbeous basal color showing through); ears faintly edged with whitish; tail nearly unicolor, dusky above, slightly paler below; fore and hind feet clouded with dusky, the toes of hind feet whitish.

Skull.—Somewhat like that of *N. tenuicauda*, but nasals more wedge-shaped, much longer and narrower, reaching plane of lachrymals; ascending branches of premaxillæ very long, reaching beyond plane of lachrymals; frontal region broader and flatter posteriorly; teeth smaller. Compared with that of *N. parvidens*, the skull is larger and flatter, braincase larger and more smoothly rounded; nasals and ascending branches of premaxillæ longer; teeth larger.

Measurements.—Type: Total length, 325; tail vertebræ, 156; hind foot, 34. Skull of type: Greatest length, 41.3; basilar length of Hensel, 33 5; zygomatic breadth, 22.2; length of nasals, 16.5; interorbital breadth, 5.8; palatal length, 7.9; diastema, 11.2; upper molar series on alveolus, 8.3.

Specimens examined.—Two, from the type locality.

Liomys parviceps sp. nov.

Type from La Salada, 40 miles south of Uruapan, Michoacan, Mexico. Adult female, No. 126,477, U. S. National Museum, Biological Survey Collection, March 19, 1903, E. W. Nelson and E. A. Goldman. Original number 16,194.

Characters.—Size very small; color reddish; tail of moderate length. Similar to *L. plantinarensis* but less fulvous; skull smaller; tail slightly longer; hind foot shorter, 6- instead of 5-tuberculate.

Color.—Upper parts grizzled brownish fulvous; under parts, fore and hind feet, white; fulvous lateral line rather faint; ears edged with whitish; tail distinctly bicolor, brownish above, whitish below.

Skull.—Smallest of the known species of the genus. Similar to that of *L. plantinarensis*, but smaller and flatter; braincase less expanded; interparietal smaller; rostrum less decurved; nasals more arched anteriorly, notched posteriorly as in *L. plantinarensis*.

Measurements.—Type: Total length, 202; tail vertebræ, 110; hind foot, 24. Average of five adult males and females from the type locality: Total length, 204 (197–214); tail vertebræ, 105 (102–110); hind foot, 24 (24). Skull of type: Greatest length, 28.3; basilar length of Hensel, 20; zygomatic breadth, 13; length of nasals, 11.5; interorbital breadth, 6.7; interparietal, 3.2 x 8.3; upper molar series on alveolus, 4.2.

Specimens examined.—Total number, 16, from the following localities: La Salada, Michoacan (type locality), 11; Rio Balsas, Guerrero, 5.

VOL. XVII, PP. 83-90 APRIL 9, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE VEGETATIVE VIGOR OF HYBRIDS AND MUTATIONS.*

BY O. F. COOK.

Under what has been termed a kinetic theory of evolution † it has been held that the condition most favorable to evolutionary progress is that found in natural species containing numerous individuals, widely distributed and freely interbreeding. The individual diversity of members of large assemblages of organisms is greater than when interbreeding is confined to narrow limits, but under persistent close breeding uniformity or "fixity" of type is followed, eventually, by very pronounced and abrupt variations, and by a decline of reproductive power.

On the other side of the evolutionary highway corresponding phenomena abound. Interbreeding among the normally diverse members of a species in nature strengthens the organism and aids in distributing variations throughout the species, but when individuals from small, close-bred groups are crossed their characters may prove antagonistic, and not to be combined or averaged in the offspring, as discovered by Mendel. When still more remote types are brought together the resulting hybrids are often abnormally diverse, and may have characters possessed by neither of the parents. Because pronounced variations are thus obtainable both by narrow inbreeding and by wide crossbreeding these extreme stages have been thought to have great

* Read before the Biological Society of Washington, November 28, 1903.

† Science, N. S., **13**: 969, 1901; Popular Science Monthly, **63**: 18, 1903.

evolutionary significance, but the degenerative character of organisms which have suffered such abnormally abrupt changes is rendered obvious by their inability to propagate their kind.

The partial or complete sterility, both of hybrids and of "sports" or "mutations," as the variations of inbred plants are now called, has long been a matter of common knowledge among breeders of plants and animals, but current evolutionary theories do not associate the two groups of phenomena as belonging to corresponding sidepaths of the evolutionary thoroughfare. The failure to recognize this relationship is to be explained partly by the general carelessness in applying such terms as "hybrid" to a great variety of evolutionary conditions,* and partly by the fact that in spite of their declining reproductive power, both mutations and hybrids often show striking vegetative vigor.

ECONOMIC VALUE VERSUS REPRODUCTIVE FERTILITY.

To recognize and, if possible, to account for this paradox is of practical as well as of theoretical importance, since the propagator, like the biologist, commonly reasons that the more rapid and vigorous the growth of the young plant, the earlier and the larger the harvest. Indeed, this calculation is generally correct, since a large proportion of our domesticated species are not valued for their reproductive efficiency, but for one or another of their vegetative parts. Even in our horticultural crops, such as apples, pears, cherries, plums, berries, oranges, pineapples, and bananas, which we think of as being planted for their fruits, it is not the seed itself which is utilized or desired, but the fleshy pulp. The decline of reproductive fertility, or tendency toward seedlessness, is not looked upon as a disadvantage, if the plant can be propagated asexually, but often lends special value to a new variety, particularly if correlated with vegetative vigor.

The great economic value of a seedless grape or orange need not obscure, however, the obvious fact that the plant itself is degenerate, and would have no prospect of self-perpetuation under natural conditions.† Neither should the utility of some

* Popular Science Monthly, **63** : 225, 1903.

† Mr. Walter T. Swingle notes that in some of the asexually propagated cacti of Arizona vegetative vigor might more than compensate for seedlessness, so that nearly sterile hybrids or mutations would have a distinct advantage over the parental types.

degenerate plants prevent our appreciating the worthlessness of others, or keep us any longer from realizing that methods of breeding calculated to increase the commercial importance of one plant may be utterly destructive to another. A seedless cherry might bring a fortune to its discoverer, but a vigorous and beautiful seedless coffee tree found recently in Costa Rica is of use only in adding emphasis to the fact that all the known variations of this plant which have appeared in cultivation are less fertile than the normal type of the species, and hence are described properly as degenerative, in the original, practical sense of this term, and in its evolutionary sense as well.

SELECTIVE EXPLANATION OF CULTURAL "IMPROVEMENT."

The evolutionary significance of the degeneracy of a large proportion of the domestic varieties of plants and animals has also been obscured by theories that their "improved" characters have been given to them by selection. It is true that the changes have taken place along with a process of selection, but nobody has furnished any tangible reason for believing that the selection causes the changes or can cause them. Neither has it been shown that the new conditions of growth are of much evolutionary significance. The important and practical difference between nature and domestication seems to be that the latter implies narrow inbreeding and the artificial preservation of varieties which in nature would either not appear at all or which would not be able to survive.

The continued popularity of the selective theory and the consequent disregard of the degenerative character of domestic varieties are due, in large measure, to the fact that so many of them possess a vegetative vigor as great or greater than that of the wild type of the species. A sterile hybrid, the mule,* furnishes a popular symbol of strength and hardiness, and scores of similar instances might be enumerated. One of the most striking is Burbank's hybrid walnut tree, which grows several times as fast as either of its parents, but produces no fertile seeds.

*An authentic instance of the fertility of a female mule was encountered last year in the vicinity of Tapachula, in the Soconusco district of the State of Chiapas, Mexico. The colt was alive at birth and apparently normal, but did not survive.

PHYSIOLOGICAL EXPLANATION OF VIGOR OF HYBRIDS.

A physiological explanation of the vigor of sterile hybrids has been sought by supposing that the bodily energy which in other plants or animals goes into reproductive parts and processes here gives a reinforcement of growth, as often occurs after castration. This idea might find some application with the adult organism, but the unusual vigor is often apparent far in advance of the reproductive stage, and even in very young individuals. A nursery of the coffee mutation called "Maragogipe" affords a striking contrast by the side of one planted with the parent "Arabian" type, and a similar precocity of vegetative vigor is found in many hybrids. The diminution of reproductive efficiency is not, evidently, the only difference, and further facts must be taken into consideration if we are to gain a suggestion of how the body of an organism may gain in vigor after the power of perpetuating the type has declined.

THE STIMULATION OF GROWTH BY CROSSING.

The general antithesis between growth and reproduction does not suffice to explain the vigor of sterile hybrids, but by considering the cytological phase of these processes a somewhat more promising clue may be found.

Growth consists, among the higher plants and animals, of a long series of cell divisions, while reproduction requires, on the contrary, a conjugation or union of cells. It has long been supposed that the chief result of fertilization is to stimulate the cell divisions upon which the growth of the new individual depends, and that inbreeding produces defective organisms, because this stimulation is inadequate. Darwin says, for example, that "crossing, by itself, does no good" unless the individuals crossed differ somewhat in characteristics or conditions of growth. Crosses between organisms of a moderate degree of diversity are more vigorous and more fertile than if either of the parent stocks is inbred, but it appears that the limit of fertility is reached much sooner than that of vegetative vigor. This fact corresponds with what has been learned from the microscopical study of cells—that the processes of growth or cell division are much simpler than those involved in reproduction by means of the conjugation of cells. It might be supposed, therefore, that

the vegetative vigor of hybrids is the same phenomenon as the vigor of more normal crosses in spite of their reproductive decline.

KINETIC INTERPRETATION OF VIGOR.

It is not possible, however, to content ourselves with this opinion as complete and final, because it does not take into account the vegetative vigor of mutations, or variations here supposed to be induced by inbreeding, which has been thought to weaken the vegetative as well as the reproductive energies of the organism. Viewed from the standpoint of some of the current theories of evolution, the association of the vegetative vigor of mutations with that of normal crosses and hybrids is certainly not obvious, but the difficulty disappears if we view the question from another standpoint and perceive that the additional vigor may be interpreted in both cases as a phenomenon attending vital motion. Evolutionary progress is accomplished both by new variations and by the combination of those already existing.* Normal crosses and abnormal hybrids and mutations may both be thought of as more vigorous than uniform inbred stocks because they have moved into new positions in the field of development. Variation and cross-fertilization serve the same purpose, and under normal conditions of interbreeding both result in increased vigor and prepotency. The important evolutionary function of cross-fertilization is the mutual communication of variations. Continued variation, change, and diversity are the general tendencies, not uniformity and stability of characters. Organisms are not subject to simple inertia, but, like bicycles and gyroscopes, maintain their equilibrium only when in motion.

Plants often receive an increased impetus of growth by removal to new soils, or by changes of the constituents of the soils through what are significantly called "fertilizers." It is also known that they sometimes respond notably to the presence of small quantities of minerals not used by them, or even to those directly injurious, just as arsenic, prussic acid, and other active poisons serve in medicine as tonics. As a result of a similar stimulation of growth by mineral salts applied to the eggs of some of the lower animals, Professor Jacques Loeb was able to

* "Stages of Vital Motion," Popular Science Monthly, **63**: 14, 1903.

induce a parthenogenetic development which was widely reported two or three years ago as "artificial fertilization."

Cross-fertilization and self-fertility, like most terms, are relative. Many plants have been accounted self-fertile because they can propagate without crossing for a few generations. Thus Wallace has suggested that widely distributed plants are self-fertile, the stimulation of new conditions serving, as it were, as a substitute for crossing. This is doubtless true within limits, but should not be taken to mean that complete autogamy is maintained in this manner.* The effects of new substances and new external conditions, while perhaps to be best understood from the evolutionary standpoint, have not the evolutionary significance often ascribed to them, since the increased vigor and other modifications obtained are neither permanent nor hereditary.

Perhaps for lack of a rational explanation of the known benefits of change of descent or of external conditions, both agriculture and medicine are still practiced largely on the theory that there is some particular food, tonic, fertilizer, or climatic treatment which is best for each plant, animal, or disease. When it is appreciated that even the best is best only while it is recent or new, kinetic systems of farming, feeding, and curing may be elaborated, which shall increase agricultural productiveness and human health by properly determined successions or alternations of diets, tonics, climates, or soils. The rotation of crops, the interchange of seed between different regions, the application of fertilizers, and the breeding of new varieties, more vigorous and resistant, are different methods of attaining the same practical results, and the utility of the several expedients may be found to rest on a single biological law.

The vegetative vigor of hybrids and mutations is not a difficulty, then, in a kinetic theory of evolution, but affords a strongly corroborative series of phenomena. The defective reproduction is the abnormal fact, and this appears to be definitely associated with a lack of normal interbreeding. The organism may be prospered in its growth by any change not

*Mr. Swingle suggests also that the heteroecism of the parasitic rust-fungi may be a phenomenon of the same kind. The diverse forms which the same rust assumes on its different hosts may be looked upon as a further adaptive substitute for interbreeding.

too violent, and its vigor may be increased even by the degenerative variations which follow upon the absence of normal interbreeding. When thus halted or hindered the vital mechanism but turns aside the further because it has lost the equilibrium of normal motion.

It is not necessary to regard variation as abnormal, but the variations which appear under narrow inbreeding and wide cross-breeding are abnormal in their amplitude, like fluctuations of temperature in disease. That even completely sterile mutations and hybrids may enjoy exceptional vigor does not change the fact of abnormality, but shows merely that the evolutionary disorder affects the reproductive rather than the vegetative parts. Both in hybrids and in mutations the tendency to sterility sometimes appears so early that the plants do not produce flowers, or there may be a progressive sterilization of the essential organs of the flowers, as in the so-called "doubling" which has appeared independently in so many mutations of cultivated plants. Others may form apparently normal blossoms in profusion, but set no fruits; fruits may develop without seeds; seeds may be produced which will not germinate, or seedlings may grow, but never mature. There are all possible stages from normal fertility to complete sterility, as there are endless gradations between normal shape and monstrous deformity.

The present interpretation of the facts has at least the merit of simplicity, since it permits us to suppose that the same evolutionary vigor appears in normal variations and crosses, and in abnormal mutations and hybrids, and that the same evolutionary debility affects the two latter conditions. The vigor is due neither to sterility nor to selection, but to variation; the sterility is not explained by normal variation, nor by selection, except as selection implies the absence of normal interbreeding, and the consequent weakening of heredity.

Physiology in the narrower sense, the science of nutrition and other bodily functions, does not explain either the vigor or the debility, but in the broader view evolution itself becomes a physiological process, since it affects not merely the form and structure, but determines also the quality and efficiency of the organism, in quite as practical and definite a manner as do food-supply and other external conditions.

VOL. XVII, PP. 91-98 APRIL 9, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW PLANTS FROM NEVADA.

BY AVEN NELSON.

For two or three years past, Mr. F. Beveridge Kennedy, Professor of Botany, Nevada State University, has been very industriously studying the flora of his state. While his attention has been given to its economic aspects in particular, yet the herbarium he is building up must add much to our knowledge of its species. He has very kindly permitted me, from time to time, to study many of these collections. Among the choice things secured there are several numbers that seem to be novelties. Following are the diagnoses as I make out them out. Unless otherwise stated the types are deposited in the Rocky Mountain Herbarium.

Arabis pedicellata sp. nov.

Perennial from a thick woody or sub-fleshy root; the base of the stem also persisting as a caudex; caudex thick (1-2 cm.), leafless but rough with the dense covering of the dead persistent petioles, in length from a mere crown to nearly 1 dm. (according to the age of the plant); stems one or more from the crown, lightly pubescent or nearly glabrous above, stem proper or leaf-bearing portion but slightly surpassing the crown-leaves; leaves canescent with a dense indument of soft stellately branched hairs; those of the crown large and numerous, narrowly oblong or oblanceolate, obtuse or subacute, often 1 dm. long, tapering into a much

shorter somewhat margined petiole; those of the stems small, oblong-lanceolate, 2-3 cm. long, sessile by an auricled base; inflorescence naked, at length very open, 10–15 cm. long; pedicels spreading, at length at right angles to the rachis, becoming 3 dm. or more in length; pods similarly spreading, as long as the pedicels, tapering into a beak-like style one fourth as long as the pod, sessile on an enlarged receptacle, flattened parallel to the partition, faintly 1-nerved; sepals oblong, erect, greenish with scarious pink margins, half as long as the petals, the lateral pair noticeably spurred at base, the other pair only slightly gibbous; petals purple, broadly spatulate, with nearly flat blade and cuneately tapered to a short narrow claw; stamens free; stigma small, circular; seeds immature.

The generic position of the plant seems somewhat doubtful. I call it an *Arabis* because of its duration, its branched pubescence, its gibbous sepals, its nearly flat broad petals, its flat 1-nerved pods. But some of these characters are also ascribed to some of the species of *Streptanthus*. In fact this plant has somewhat the appearance of a *Streptanthus* especially in its beaked pods, sessile on an enlarged receptacle. In this respect it reminds one of *S. longirostris* Wats., but one may well question if that species were not better left in *Arabis* where Dr. Watson originally placed it. However, if that species remains a *Streptanthus*, it is possible that the species here described must become *Streptanthus pedicellatus*.

Founded upon Kennedy & True's No. 705, Hunter Creek Canyon (near Reno, Nev.), May 16, 1903.

Viola senecta sp. nov.

Grizzly-white, with rather long, dense, tangled-hirsute pubescence; stems short, slender, from a thickened branched root; leaves ovate, subacute, more or less irregularly toothed, 1-3 cm. long, abruptly or cuneately tapering into the rather long slender nearly glabrous petiole; stipules scarious, mostly entire, linear-lanceolate, somewhat ciliate-pubescent; scapes shorter than the leaves; sepals lanceolate, about 5 mm. long, sparsely ciliate; petals yellow, glabrous, obovate-spatulate, 7-8 mm. long; the lower a little longer, with orbicular blade, abruptly inflexed at base, enclosing two anthers, scarcely at all spurred; connective of anthers produced into a greenish ovate appendage.

This is probably *V. præmorsa* in so far as Nevada specimens cited in literature are concerned. It seems to have characters that demand its separation. The type was collected by Prof. F. H. Hillman, "near Peterson's Ranch", Nev., April 20, 1895,

Mirabilis glutinosa sp. nov.

Stems several from a branched woody caudex, 2-4 dm. high, more or less branched from the base up, somewhat pubescent especially above,

the hairs flattened or crinkled and more or less glandular-glutinous; leaves reniform, orbicular or broadly ovate-cordate, obtuse at apex and mostly broadly rounded, 1-3 cm. long, short petioled or the uppermost nearly sessile; involucre campanulate, 5-lobed, 1-flowered, short-peduncled (3-12 mm.); its lobes short-ovate, subacute; pubescence of leaves and flowers similar to that of the stems and peduncles; perianth white, campanulate-funnelform, 10-12 mm. long, its very broad segments cleft into two equal oval lobes; fruit fig-shaped, glabrous, somewhat striate.

This species has usually been considered only a form of *M. californica* Gray. Dr. Coville in his Report upon the Death Valley Expedition (Contrib Nat. Herb., 4:177) points out the fact that there are two forms which may be distinct. It seems quite probable there are three forms, as there seems to be no good reason for asserting that *M. laxis* (Benth) and *M. californica* are the same. The former came from "Magdalena Bay" and was described as glabrous and as having very unequal involucral bracts. This may well be different from *M. californica* in spite of the fact that it apparently has escaped subsequent collection. It may have happened, too, that the locality at which "H. M. Ship Sulphur" secured the specimens is incorrectly given, as has often happened when large quantities of material are secured in an important expedition.

As to the distinctness of *M. californica* and the species now proposed there can be no question. *M. glutinosa* may at once be known by its subspherical obtuse leaves, its short rather obtuse involucral lobes, and its white flowers. Apparently very few of the flowers ever open but are self-fertilized in the bud. On close examination of the involucre and perianth attention is attracted to the large number of acicular hairs or lines (raphides) in the epidermis both on the outside and inside of these structures.

I take as the type L. N. Goodding's No. 967, from Karshaw, Meadow Valley Wash, Nev., May 27, 1902. Wholly typical are the following: Goodding, No. 778, St. George, Utah; C. H. True, No. 758, Pyramid Lake, Washoe Co., Nev.

Sidalcea crenulata sp. nov.

Perennial from a thick woody root; stems few to several from the crown, nearly simple, more or less decumbent, 3-5 dm. high, green and seemingly glabrous but with some small scattered simple or forked hairs; leaves sparsely appressed pubescent, the hairs simple or forked; the radical orbicular, 2-5 cm. broad, crenulately toothed, the teeth somewhat paired, on petioles 3-5 times as long as the blade; stem leaves more deeply cleft and the uppermost parted into linear divisions; stipules linear, 7-10 mm. long, subglabrous as are also the petioles; raceme slender and at length open; the rachis green, granular-glandular; bracts linear, paired, 5-8 mm. long, pedicels at length equalling the calyx; calyx cleft nearly to the base into lanceolate segments, about 6 mm. long, minutely glandular-pubescent and with occasional longer forked

hairs; petals orbicular, emarginate and slightly erose-dentate, 12-15 mm. long, with a short claw; stamineal column rather short; styles not surpassing the anthers; carpels smooth, easily splitting along the dorsal line, deeply notched but not lacerate on the ventral side.

Rather too nearly allied to *S. neo-mexicana* Gray but easily distinguished from it. *S. neo-mexicana* may always be known by its almost hispid hirsuteness which is especially noticeable on the stems, petioles, leaf-veins and calyx. The typical form of this species too is mostly much larger, and often with a single stem from a conical root. It also has a longer stamineal column from which the styles are noticeably exserted.

Mr. Goodding's No. 1091, Juab, Utah, June 10, 1902, is taken as the type. Nearly typical are the following by Prof. Kennedy; No. 673, Simon's Creek, Elko Co., Nev., and No. 811, Stampede, same county.

Sidalcea nervata sp. nov.

Perennial; stems singly from the small woody root, usually somewhat branched above, glabrous below, sparsely and minutely stellate-pubescent above; leaves apparently glabrous but with short forked hairs above and a minute stellate pubescence below, strongly nervosely veined below; the basal long-petioled, orbicular, 6-8 cm. broad, 6-8 lobed, the lobes with 2-3 broad teeth; becoming more deeply divided upwards, the uppermost cleft to the base into linear lobes; stipules narrowly linear; inflorescence densely stellate-pubescent, rather few-flowered; calyx cleft below the middle, the lobes triangular-lanceolate; petals broadly obovate, emarginate, about 2 cm. long, half as broad, pubescent on the short united claws; carpels glabrous, distinctly rugose-reticulated on the dorsal angles, slightly depressed.

A perfectly distinct species allied to *S. oregana* Gray from which its relatively few, much larger flowers will at once distinguish it. It may also be distinguished by its smaller calyx, less acuminate calyx-lobes, short pedicels which are distinctly exceeded by the slender bracts. The inflorescence never presents that crowded spicate appearance of *S. oregana* with its numerous small flowers.

I take as the type my No. 4101, Evanston, Wyo., distributed some years since as *S. oregana*. What seems to be the same is Prof. Kennedy's No. 564, Little Lakes Canyon, Elko Co., Nevada. Somewhat more pubescent and probably showing its variation and distribution are Mr. M. E. Jones's Nos. as follows; 5597, Soldier Summit, Utah, distributed as *S. glaucescens;* 6207, Salubria, Idaho, distributed as *S. campestris.*

Sphæralcea parvifolia sp. nov.

Stems several or many from a rather large woody root, erect, rather slender, only 2-4 dm. high, at first densely stellate-canescent but gradu-

ally denuded and becoming bright green with only scattered stellate hairs: leaves small, suborbicular with truncate or subcordate base, 1-2 cm. broad, irregularly crenulate, scarcely lobed, rather thick and slightly rugose, densely stellate-canescent, ultimately more or less denuded and greenish above; the thyrsoid raceme seemingly nearly naked, but the (3-flowered) clusters axillary to the reduced leaves which above are mere bracts; pedicels slender, variable, often longer than the calyx, densely stellate-pubescent as is also the calyx and fruit; calyx about 6 mm. long, cleft below the middle, its lobes triangular-lanceolate: petals rhomboid-obovate, inequilateral with oblique summit, scarcely emarginate, about 12 mm. long; fruit slightly depressed, white with the dense pubescence, only 5 mm. broad and not so high; carpels wholly muticous, the back and rounded dorsal angles subcartilaginous and the sides altogether smooth and membranous, 2-ovuled and often 2-seeded.

This was recently distributed as *S. ambigua* but without any justification it would seem. It is altogether a much smaller plant in every way and the smooth-sided carpels would take it quite out of that section of Gray's revision (Proc. Am. Acad., **22**:292) and of the revision as extended by Dr. Robinson in Syn. Fl. **1**[1]:315. For equally good reasons it cannot well go into the section with *S. Emoryi* with which it also has some affinities.

Collected by L. N. Goodding at Calientis, Nevada, May 22, 1902, No. 916.

Sphærostigma tortuosa sp. nov.

Perennial from the enlarged crowns of slender rhizomes; stems usually several from the crown, spreading or erect, glabrous, somewhat striate, 1 dm. (more or less) in length, the longer ones inclined to be naked near the base; leaves entire, glabrous, narrowly oblong or linear-oblanceolate, 1-3 cm. long, tapering into a slender petiole about as long as the blade, numerous on the crowns and in the lower portion of the inflorescence; flowers numerous, crowded at the summit of the gradually elongating raceme, usually also some among the crown leaves; calyx tube obconic, about 4 mm. long, equalled by the lanceolate reflexed segments; petals white, broadly obovate, as long as the calyx-lobes; stamens subequal, with oblong anthers, about as long as the petals and the slender style; stigma small, capitate; capsule linear, 1 cm. or more in length, angled with rounded cartilaginous ribs, strikingly contorted and entangled in the leafy raceme and among the leaves of the crown; seeds oblong, obtuse at apex and pointed at base.

This fine species was collected by Prof. P. B. Kennedy at Truckee Pass, Virginia Mts., Washoe Co., Nevada, June 16, 1902.

Phacelia monosperma sp. nov.

Biennial; stem simple, erect, rather stout, 3-4 dm. high, appressed-

puberulent with some longer scattered hairs; leaves pinnatifid or those above nearly entire, oblong in outline, petioled, with short matted pubescence and some longer scattered white hairs; inflorescence of nearly straight, slightly divergent secund spikes, softly hispid, and giving the whole plant the appearance of certain *Asperifoliæ;* sepals similar, linear-oblong, in fruit 5-7 mm. long, hispid-ciliate; corolla campanulate, barely as long as the sepals, its rounded lobes shorter than its tube, color in doubt, appendages narrow, somewhat united at the base of the filament; stamens well exserted, the filaments sparsely long-bearded on the exserted portion; the very slender style cleft to the middle; capsule ovate, pointed, somewhat compressed, included; seed solitary (only one maturing), conical-oblong, brown, beautifully retriculate-pitted, 2-3 mm. long, slightly carinate ventrally.

In its solitary seed it resembles *P. platyloba* Gray, which is a somewhat viscid heterosepalous annual; in its pubescence and some other characters *P. hispida* Gray which is a diffusely branched annual.

The type was collected by Prof. F. H. Hillman, June 30, 1893, on Alum Creek in the Sierra foothills.

Mertensia nevadensis sp. nov.

Perfectly glabrous throughout; roots large and ragged, the crown clothed with the brown dead bases of the leafstalks of former years; stems 1-2 dm. high, slender, simple; crown leaves numerous, large for the plant, oblong, obtuse or subacute, 6-8 cm. long, 1-2 cm. broad, on slender petioles nearly as long as the blade; stem leaves smaller, becoming sessile and lanceolate above; inflorescence terminal, crowded; the short pedicels slender; calyx about 4 mm. long, its entire lanceolate segments about 3 mm. long; corolla tubular, its limb but slightly dilated, about 15 mm. long (tube 9 mm.; throat 4 mm.; the obtuse rounded lobes only 2 mm.); stamens equal, inserted on the margin of the throat; the filaments broader than the anthers and about as long; throat-crests conspicuous, tipped with brown, broad and noticeably saccate; corolla tube glabrous within but at the base a ring of 10 very minute paired nectariferous pits, one pair on each of the 10 principal nerves of the tube; style about equalling the stamens.

The only species that this seems comparable with is *M. oblongifolia* Don. but to this it only bears some resemblance in its floral characters. It differs from that species in its large elongated root; its larger (not succulent) leaves; its fewer-flowered more open inflorescence.

Type collected by Messrs. Kennedy and True (No. 711) who report it as common in Hunter Creek Canyon, near Reno, Nevada, May 16, 1903.

Pentstemon violaceus (Brand) Nelson.

Obscurely puberulent throughout; stems several from the scarcely

woody branched crown, 1-2 dm. high; leaves oblong or oblanceolate, 2-3 cm. long; the upper sessile, the lower tapering into a slender petiole; thyrsus narrow, obscurely glandular or viscid; calyx short, not more than 2-3 mm. long; the sepals broadly oval or obovate, obtuse but sometimes with a small apiculation; corolla 12-15 mm. long, moderately and gradually dilated, the limb very short and but slightly 2-lipped, its lobes obtuse; anthers horse-shoe shaped, the lower half of the cells remaining closed and saccate, minutely denticulate-ciliate on the margins of the dehiscence; the sterile filament glabrous and not dilated.

Most nearly allied to *P. Roezli* Regel but with broader leaves, narrower inflorescence (not at all paniculate) and very different sepals and corolla. This is very probably *Pentstemon Roezli violaceus* T. S. Brand. I therefore use his varietal name and give the additional description as above.

Secured by Prof. Kennedy at Newcomb Lake, June 8, 1901, No. 15.

Pentstemon Kennedyi sp. nov.

Perennial from a somewhat woody branched root-like caudex, glabrous and inclining to glaucous, 2-4 dm. high; stems mostly simple and singly from the crowns, erect; leaves narrowly oblong or lanceolate; the basal tapering gradually into a slender petiole; the mid-stem sessile by the narrowed base; the upper becoming linear and bract-like; inflorescence narrow; calyx about 1 cm. long; sepals lanceolate, scarious-margined below, the somewhat acuminate upper half tinged with purple; corolla about 3 cm. long, somewhat ventricose, violet-blue (possibly varying to purple); anthers glabrous, dehiscent from base to apex but not confluent, slightly if at all divaricate; sterile filament glabrous and but slightly dilated.

This is one more segregate from the *P. glaber* group, Difficult as it is to say what are valid specific characters, it becomes almost necessary to designate as distinct those forms which the collector and the amateur refuse to unite. On the other hand it seems like folly, in most cases at least, to separate forms upon details which require the compound microscope for detection. A difference that is reasonably constant and sufficiently characteristic to attract the attention of a trained observer in the field cannot well be ignored. Usually, as in this case, less obvious details will be found to confirm the field impressions. In separating this form from *P. glaber* Pursh, it may tend to clearness to recall the following characters of the latter:

Leaves oblong-lanceolate below to ovate-lanceolate above; sepals short, not more than one-sixth as long as the corolla, orbicular-ovate, mostly abruptly short-acuminate, noticeably erose on the scarious sides; anthers more or less short-hirsute; the cells becoming divaricate or explanate; sterile filament dilated, usually somewhat emarginate, stiffly short hirsute near the apex.

The excellent specimens that are taken as the type (No. 736) were collected by Prof. Kennedy at Truckee Pass, Virginia Mts., Washoe Co., Nevada, June 6, 1903.

Lagophylla Hillmani sp. nov.

Annual, about 2 dm. high; stems slender, erect, simple or with a few slender ascending or erect branches, sometimes branched from the base, obscurely granular-glandular pubescent with a few scattered long white hairs; leaves linear, thinly strigose and minutely scabrous; heads terminating naked peduncles, rather large for the genus, 6-8 mm. high; involucre strigose-hispid, some of the hairs tipped with black glands as are also some of those on the peduncles; rays 5-6, light-yellow (?), the lingule broadly oblong, 5-7 mm. long, cleft nearly to the middle into oblong obtuse lobes; disk flowers about 25, apparently all sterile; akene narrowly oblong-obovate, closely enwrapped by the scarious, ciliate-pubescent inflexed base of the involucral bracts, the upper half of which is plane and narrowly lanceolate; bracts between the ray and disk not numerous.

Not very closely allied to any species known to the writer. In aspect intermediate between *Lagophylla* and *Layia* but by reason of the rays, the complete absence of pappus and the abortive disk achenes will have to be considered a species of *Lagophylla*.

Collected by F. H. Hillman, between Truckee and Lake Tahoe, Sept., 1894.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A DECADE OF NEW PLANT NAMES.

BY AVEN NELSON.

Atriplex Serenana.

Atriplex bracteosa S. Watson, Proc. Am. Acad., **9**:115, 1874; not *A. bracteosa* Trautv., Act. Hort. Petrop **1**[1]:117, 1870.

Atriplex Watsoni.

Atriplex decumbens S. Watson, Proc. Am. Acad., **12**:275, 1877; not *A. decumbens* Roem. & Schult., Syst., **6**:289.

Atriplex pacifica.

Atriplex microcarpa Deitr., Syn. Pl., **5**:536, 1852; not *A. microcarpa* Waldst. & Kit., Pl. Rar. Hung., **3**:278, t. 150, 1812.

Atriplex matamorencis.

Atriplex oppositifolia S. Watson, Proc. Am. Acad., **9**:118, 1874; not *A. oppositifolia* D. C., Rapp., **1**:12, nor *A. oppositifolia* Will., Prosp., 21. Exact dates not at hand but both publications earlier than Watson's. Besides these there is *A. patula oppositifolia* Moq., Enum. Chenopod. 54, 1840.

Atriplex joaquinana.

Atriplex spicata S. Watson, Proc. Am. Acad., **9**:108, 1874; not *A. spicata* Stokes, Bot. Mat. Med., **2**:24, 1812.

Viola Kelloggii.

Viola purpurea Kellogg, Proc. Cal. Acad. (II) **1**:55, 1873; not *V. purpurea* Stev., Bull. Soc. Nat. Mosc., **29**:310, 1856.

Castilleja exilis.

Castilleja stricta Rydb., Mem. N. Y. Bot. Gard., **1**:354, 1900; not *C. stricta* D. C., Prodr., **10**:534, 1846.

Pentstemon formosus.

Pentstemon pulchellus Greene, Pitt, **3**:310, 1898; not *P. pulchellus* Lindl. Bot. Reg. t. 1138.

Pentstemon superbus.

Pentstemon puniceus A. Gray, Torr. Bot. Mex. Bound., 113, 1859; not *P. puniceus* Lilja., Linnaea, **17**:111, 1843.

Pedicularis Grayi.

P. procera Gray, Am. Jour. Sci. (II) **34**:251, 1862; not *P. procera* Adams, ex. Stev. in Mem. Soc. Nat. Mosc., **6**:33, 1823.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

SONORELLA WOLCOTTIANA—A CORRECTION.

Owing to an oversight in proof reading of the description of *Sonorella walcottiana*, Proc. Biol. Soc. Wash., Vol. XVI, pp. 103-104, June 25, 1903, the name appeared as above. The species was named in honor of Mrs. H. L. T. Wollcott, the collector, and the name should read *Sonorella wolcottiana.*—*Paul Bartsch.*

THE SPECIES OF GEUM OCCURRING NEAR WASHINGTON.

Four species of *Geum* are said by Ward (Bull. U. S. National Museum, No. 22, p. 77, April 20, 1882) to occur in the neighborhood of Washington: *G. album*, *G. virginianum*, *G. strictum*, and *G. vernum*. The third of these proves to have been incorrectly recorded, as the specimen labeled *Geum strictum* in the Ward herbarium is unquestionably *G. virginianum*. Moreover, the locality where it was collected, Hunting Creek, Fairfax Co., Virginia, with which I am thoroughly familiar, is not a place where the northern plant, if found in this region at all, would be likely to occur. The number of species in the local flora will, however, remain unchanged, as *Geum flavum*, though not hitherto recorded, is common in Fairfax County. According to my observations, during the past two summers, it seldom if ever grows in the damp, heavily shaded locations often frequented by *G. canadense*, and never in the half-boggy thickets preferred by *G. virginianum*, but usually occurs in open dry woods.—*Gerrit S. Miller, Jr.*

SPELERPES PORPHYRITICUS IN NEW HAMPSHIRE.

Mr. Edward S. Wilson caught in a cold mountain brook at Bridgewater, N. H., in June, 1902, a specimen of this species. The brook empties into Lake Pesquaney (New found lake), and where the animal was caught is about seven hundred feet above sea level. I am not aware that this species has been taken as far north. The specimen is now in the collection of Camp Pesquaney, Bridgwater, N. H., and was identified by Dr. Samuel Garman.—*Reginald Heber Howe, Jr.*

NANNORCHILUS, NEW NAME FOR HEMIURA, PREOCCUPIED.

In 1888, finding that *Uropsila* as used for a genus of Troglodytidæ was preoccupied, I proposed the name *Hemiura* as a substitute. This proves also to have been used previously, so it becomes necessary to replace it by another. The synonymy of the genus, to date, is follows.

Nannorchilus Ridgway.

Uropsila (not *Uropsilus* Edwards, 1872) Sclater and Salvin, Nom. Av. Neotr., 1873, 155. (Type, *Troglodytes leucogastra* Gould.)

Hemiura (not *Hemiurus* Rudolphi, 1809, nor Gervais, 1855) Ridgway, Proc. U. S. Nat. Mus., X, Aug. 6, 1888, 511. (Substitute for *Uropsila* Sclater and Salvin, preoccupied.)

*Nannorchilus** Ridgway, nom. nov. (Type, *Troglodytes leucogastra* Gould.) —*Robert Ridgway.*

A PREOCCUPIED CRAB NAME.

The name *Melia* used by Latreille in 1825, for a genus of crabs (Encyc. Méth., X, 705), is preoccupied by *Melia* Billberg, 1820, a genus of amphipods (Enum. Insect.). I am obliged to Dr. Walter Faxon for verifying this reference. Latreille's genus, which has for type the curious anemone-grasping species, *M. tesselata* (Latr.), may be known as *Lybia*, a name used by Milne Edwards in 1834 (Hist. Nat. Crust., I, 431) before he was aware of Latreille's genus.—*Mary J. Rathbun.*

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*Νάννος, dwarf: ὀρχίλος, a wren.

Vol. XVII, pp. 103-110 May 18, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF SEVEN NEW RABBITS FROM MEXICO.

BY E. W. NELSON.

The Biological Survey Collection contains several hundred specimens of rabbits from Mexico, including representatives of all the species known to occur in that country, outside of Lower California. Recent examination of this material shows that in addition to the known species it contains the two strongly marked new species and five new subspecies which are described below. I am indebted to Dr. C. Hart Merriam, Chief of the Biological Survey, for the opportunity to study this material, and to Mr. Vernon Bailey for suggestions regarding the species found along the boundary line, with which recent study has made him familiar. I am also under obligations to Mr. Gerrit S. Miller, Jr., Assistant Curator of Mammals, U. S. National Museum, to Dr. J. A. Allen, of the American Museum of Natural History, and to Mr. Outram Bangs, of the Museum of Comparative Zoology, for the use of material from the collections in their charge for comparison.

Subgenus **Sylvilagus** Gray.

Lepus insonus sp. nov.

OMILTEME RABBIT.

Type.—Adult female, No. 126,878, U. S. National Museum, Biological Survey Collection, from Omilteme, Guerrero. Collected May 20, 1903, by E. W. Nelson and E. A. Goldman. Original number 16,466.

Distribution.—Known only from type locality.

General characters.—A dark, coarse-haired species with small short tail belonging to same group as *Lepus gabbi* and *L. truei*, but considerably larger, with ears twice as large as in either of species named.

Description of type in spring pelage.—Top of head and back dark ochraceous buffy, approaching tawny ochraceous, heavily shaded and grizzled with black; cheeks and sides of body and rump a little paler and grayer than back; sides of nose and area about eyes dingy buffy grayish; nape dull dingy rusty rufous; top of tail dull dark reddish brown; under side of tail dingy brownish buffy; neck on sides and below dull dark buffy; rest of under parts white with bluish under fur showing through; tops of fore feet and under side of fore legs dingy whitish; front and sides of fore legs to shoulders tawny ochraceous; front of hind legs and tops of feet dingy whitish; rest of hind legs similar to sides but with a tawny ochraceous wash becoming most marked about heels and sides of hind feet; soles of feet dark smoke brown; ears on convex surface dark grizzled blackish brown, a little more blackish along anterior border and at tip.

Skull characters.—Skull practically indistinguishable from that of *L. truei*, but apparently with slightly shorter, heavier jugal.

Measurements.—External measurements of type (taken in flesh): Total length, 430; tail vertebræ, 40; hind foot, 93; ear from notch (from dried skin), 62.

Cranial measurements of type: Occipito-nasal length, 75; basal length of Hensel, 57; interorbital breadth, 17.5; parietal breadth, 26; length of nasals, 31.5; breadth of rostrum above front of base of premolar, 17; depth of rostrum at same point, 15; greatest diameter of bullæ, 9.

Specimens examined.—Two.

General notes.—Though obviously belonging in the same group as *L. truei* and *L. gabbi*, the curiously dark color and strikingly larger ears at once distinguish the present species. The skull is decidedly larger than that of *L. gabbi*, but is practically indistinguishable from that of *L. truei*. Like *truei*, the present well-marked species lives in burrows in heavy forest, and is very difficult to secure, owing to its mainly nocturnal habits and the heavy undergrowth in its haunts.

Lepus veræcrucis pacificus subsp. nov.

ACAPULCO COTTONTAIL.

Type.—Adult male, No. 70,622, U. S. National Museum, Biological Survey Collection, from Acapulco, Guerrero. Collected January 9, 1895, by E. W. Nelson and E. A. Goldman. Original number 7340.

Distribution.—Pacific Coast region of Guerrero and adjacent section of Oaxaca.

General characters.—Externally much like typical *veræcrucis*, but paler and more buffy. Skull larger and more massive; rostrum, especially, deeper and heavier.

Description of type in unworn winter pelage.—Upper parts, including top and sides of head, back and sides of body, dingy creamy buff washed and

grizzled by overlying black on tips of long hairs, the black wash heaviest on middle of back and palest on sides of body; top of tail dull rusty clay color; nape rusty rufous; front of forelegs and feet dingy buffy shading back into dull rusty buffy on sides of legs; hind legs like flanks on outside of thighs, but shading back into dingy rusty buffy; line along front of hind leg and top of foot white; neck on sides and below deep buffy; rest of under parts white except for a dingy buffy line on inguinal region; ears grizzled grayish brown on base, gradually darkening to narrow black tips on inner or convex surface.

Skull characters.—Skull similar in general character to that of typical *veræcrucis* but larger and more massive; rostrum much deeper and heavier in proportion; braincase narrower, more depressed and less abruptly descending on posterior outline; nasals nearly as broad anteriorly as at base; depth of rostrum from anterior base of molars nearly equals width above same point; jugals very heavy, with a deep groove ending anteriorly in a deep pit; bullæ about same size as in true *veræcrucis* but proportionately smaller.

Measurements.—External measurements of type (taken in flesh): Total length, 505; tail vertebræ, 58; hind foot, 113; ear from notch (from dried skin), 78.

Cranial measurements of type: Occipito-nasal length, 86; basal length of Hensel, 65; interorbital width, 19.5; parietal width, 26.5; length of nasals, 39; width of nasals at base, 16.5; width of nasals near tip, 13; depth of rostrum at anterior base of molars, 20; width of rostrum above same point, 19.5; greatest diameter of bullæ, 11.

General notes.—This is slightly larger than true *Lepus veræcrucis*, which ranges across all the intervening country between the eastern border of the tableland and the range of the present form. Specimens from interior Guerrero are referable to the typical form, with its smaller, lighter skull. Considering the climatic and other physiographic differences between the home of typical *veræcrucis* and the present form, there is surprisingly little difference in color.

Lepus floridanus connectens subsp. nov.

ALTA MIRA COTTONTAIL.

Type.—Adult male, No. 63,660, U. S. National Museum, Biological Survey Collection, from Chichicaxtle, Vera Cruz. Collected February 15, 1894, by E. W. Nelson and E. A. Goldman. Original number 5849.

Distribution.—Tropical parts of eastern Mexico from southern Tamaulipas throughout the coast lowlands to the Papaloapam River in central Vera Cruz and along the east slope of the Cordillera of eastern San Luis Potosi, eastern Puebla, and eastern Oaxaca south to Mt. Zempoaltepec.

General characters.—Externally much like typical *L. floridanus*, but larger and pelage averaging a little paler. Skull longer, proportionately narrower; bullæ smaller; nasals longer and slenderer. Ears large.

Description of type in faded winter pelage.—Top of head and back grizzled creamy ochraceous buffy, thinly washed with blackish by black tips to longer hairs; sides of head, body, and rump distinctly grayer and less

buffy; top of tail dull reddish brown; nape bright rusty or light cinnamon-rufous; circumorbital area white; neck on sides and below dull ochraceous buffy; front of fore legs and outside of hind legs cinnamon rufous; back of fore legs and front of hind legs and top of hind feet white with a pale buffy suffusion on feet and toes; ears narrowly edged with white; convex surface brownish gray on base gradually darkening to brownish black toward tip.

Skull characters.—Longer and proportionately narrower than in true *floridanus;* rostrum long with height equaling width at base; nasals long, proportionately narrow and depressed at tip, giving upper surface of rostrum a gently convex outline; braincase rather narrow and drawn out, giving a more gently curving outline posteriorly than in typical *floridanus;* jugal with a strong groove ending anteriorly in a well-marked pit; bullæ smaller than in true *floridanus* but larger than in *aztecus;* general outline of skull above less strongly convex than in *floridanus* and more as in *aztecus* and *russatus.*

Measurements.—External measurements of type (taken in flesh): Total length, 442; tail vertebræ, 63; hind foot, 97; ear from notch (from skin), 63.

Cranial measurements of type: Occipito-nasal length, 76; basal length of Hensel, 57; interorbital width, 18; parietal width, 26; length of nasals, 35; width of nasals at base, 16; greatest diameter of bullæ, 10.

Specimens examined.—Forty-one.

General notes.—Specimens in midsummer pelage from the humid basal mountain slopes near Jalapa, Vera Cruz, and elsewhere differ but little in color from typical *floridanus* at the same season; the legs are a little browner and less reddish, and the head is more grayish; the ears are nearly the same in size and color. Such specimens can only be distinguished by size and skull characters. From *chapmani* their much larger size, darker colors, and the much larger and heavier skull readily distinguish them. From *russatus*, the nearest relative on the south, they may be known by their paler colors, much larger ears, and broader and heavier skull. Specimens from the humid mountain slopes at Metlaltoyuca (Puebla), Jico, near Jalapa (Vera Cruz), and Mt. Zempoaltepec (Oaxaca) average rather larger and darker than those from the coast lowlands, but the difference is too slight and inconstant to warrant more than passing mention. Specimens from Mt. Zempoaltepec are intergrades between *connectens* and *russatus*, with ears approaching the latter, but their skull characters place them with the former.

Lepus floridanus chiapensis subsp. nov.

CHIAPAS COTTONTAIL.

Type.—Adult female, No. 75,953, U. S. National Museum, Biological Survey Collection, from San Cristobal, Chiapas. Collected September 28, 1895, by E. W. Nelson and E. A. Goldman. Original number 8483.

Distribution.—Interior of Chiapas and western Guatemala, from not over 2,500 feet above sea level up to the summits of the highlands at over 10,000 feet.

General characters.—Similar to *L. floridanus aztecus*, but larger and a little darker, with rufous on legs of a duller and darker shade. Skull larger, with rostrum strikingly broader and more depressed at tip.

Description of type in fresh winter pelage.—Top of head and back dark grizzled ochraceous buffy (with a slight reddish tinge) overlaid with a thin blackish wash due to black tips of long hairs; sides and rump distinctly more grayish, lacking most of the reddish buffy of back; nape rusty rufous, darker posteriorly; upper side of tail dark reddish brown, becoming blackish about tip; front and sides of fore legs cinnamon rufous; back and sides of hind legs reddish chestnut; back of fore legs and front of hind legs and top of hind feet deep reddish buffy; under side of body mainly deep yellowish buffy (some other specimens have ventral surface white); sides of head with small buffy whitish spots back of and just in front of eyes; rest of sides of head similar but a little paler than reddish buffy crown; ears with fine pale border on inner side; externally (on convex surface) blackish brown from grizzled grayish brown base to tip.

Skull characters.—Skull large and heavy; longer than in *aztecus* and about the same length as in *yucatanicus* but not so massive as in that form; rostrum very broad, especially at outer end, but depth of rostrum proportionately small; outer end of nasals broad and much less depressed than in *aztecus*, thus adding to massive appearance of rostrum viewed from above; superior outline of skull posteriorly gently curved, about as in *aztecus*, but much straighter and more flattened anteriorly; interorbital width narrow; jugal heavy, with a well-marked groove ending anteriorly in a deep pit; bullæ about same size as in *aztecus* but proportionately smaller.

Measurements.—External measurements of type (taken in flesh): Total length, 468; tail vertebræ, 55; hind foot, 97; ear from notch (from dried skin), 60.

Cranial measurements of type: Occipito-nasal length, 80; basal length of Hensel, 61; interorbital width, 18; parietal width, 26; length of nasals, 37; width of nasals, 17; depth of rostrum at front base of molars, 15; width of rostrum above same point, 19; greatest diameter of bullæ, 10.

Specimens examined.—Eleven.

General notes.—With the exception of being a little darker colored, especially the rufous on the legs, and its larger size, the Chiapas cottontail bears externally a close resemblance to *L. f. aztecus*, but its well-marked skull characters are sufficient to distinguish the two. The broad flat rostrum is a strong character which is very distinctive. So far as known, this is the southernmost subspecies of *Lepus floridanus*. In general size the skull of *chiapensis* is nearest that of *yucatanicus*, but the broader, flatter rostrum, narrower braincase, and smaller bullæ distinguish it.

Lepus arizonæ goldmani subsp. nov.

SINALOA COTTONTAIL.

Type.—Adult male, No. 96,812, U. S. National Museum, Biological Survey Collection, from Culiacan, Sinaloa, Mexico. Collected March 20, 1899, by E. A. Goldman. Original number 13,588.

Distribution.—Southern part of Sonora (from the Rio Yaqui) south at least to Culiacan, central Sinaloa.

General characters.—Darker and more richly colored than typical *arizonæ*, with the white and rufous areas on legs sharply contrasting. Bullæ much smaller.

Description of type in winter pelage.—Top of head and back creamy ochraceous-buff grizzled and washed with black; sides of head and body slightly paler, more pinkish buffy, with much less overlying black; small area on rump distinctly iron gray with scarcely a trace of buffy; nape rusty rufous; top of tail dark brown grizzled with dull buffy; neck, on sides and below, pinkish buff; rest of under parts clear white; front and sides of fore legs rusty ochraceous buff, becoming paler on front of legs and top of feet; back of fore legs clear white; sides and back of lower part of hind legs and feet a little darker and more rusty rufous than fore legs; line along front of hind legs and top of feet white, sharply outlined, as on fore legs, by rufous; inside of ears dingy gray; outside or convex surface finely grizzled grayish, buffy brown shading into a narrow blackish border about tips.

Skull characters.—Skull generally similar to that of typical *arizonæ*, but with rostrum broader and more inflated, or less tapering anteriorly and decidedly smaller bullæ, which in shape and proportion to skull resemble those of the *floridanus* group.

Measurements.—External measurements of type (taken in flesh): Total length, 388; tail vertebræ, 56; hind foot, 87; ear from notch (from dried skin), 66.

Cranial measurements of type: Occipito-nasal length, 66; basal length of Hensel, 52; interorbital breadth, 17; parietal breadth, 24; length of nasals, 27; greatest diameter of bullæ, 11.

Specimens examined.—Fifteen.

Subgenus **Macrotolagus** Mearns.

Lepus festinus sp. nov.

HIDALGO JACK RABBIT.

Type No. 53,490, adult male, U. S. National Museum, Biological Survey Collection. From Irolo, Hidalgo, Mexico. Collected March 31, 1893, by E. W. Nelson and E. A. Goldman. Original number 4522.

Geographic distribution.—Southeastern part of Mexican tableland in southern and eastern Queretaro, throughout most of Hidalgo, extreme northern part of State of Mexico (including valley of Mexico), Tlaxcala and adjacent part of northern Puebla.

Specific characters.—In general appearance much like *L. merriami* but darker, with much larger ears, the latter with a large, well-marked black spot at tip on convex side; nape gray, paler than back; skull smaller and lighter than in *merriami*.

Description of type in winter pelage.—Top of head dingy grizzled buffy; back buffy with a slight tinge of dull reddish brown, heavily mottled and grizzled with black; sides of body paler and grayer; thighs and rump up to median line iron gray; a heavy black band divides the gray of rump along median line and covers top of tail; under side of tail dingy gray; sides of head and neck dull buffy, palest on cheeks and darker with a slight tinge of vinaceous on sides of neck; under side of neck deep dull buffy; chin and under side of body white; top of hind feet dingy white becoming grayish on toes; top of fore legs dingy buffy thinly grizzled with blackish; ears finely grizzled yellowish gray on front half of convex surface, and fringed with slightly yellowish white hairs on anterior edge; posterior half of convex surface white, with a distinct black spot covering 35 mm. of the tip and extending a dusky edge around border of anterior part of tip; nape grizzled grayish without a trace of black patch characteristic of *L. merriami*.

Skull characters.—Skull lighter and rather smaller than that of *L. merriami*, and practically indistinguishable from that of *L. texianus* from Chihuahua and the Texas boundary.

Measurements of type (taken in flesh).—Total length, 575; tail vertebræ, 78; hind foot, 126; ear from notch (from dried skin), 138.

Measurements of type skull.—Occipito-nasal length, 96.5; basal length, 74; length of nasals, 43; greatest interorbital breadth, 26.5; parietal breadth, 31; depth of rostrum at front base of premolars, 25; width of rostrum above same point, 20; greatest diameter of bullæ, 14.

Specimens examined.—Nine.

General notes.—This species is apparently most closely related to *L. merriami asellus*, from which its even larger ears and entire absence of black patch on nape at once distinguish it. The nape is much like that of *L. texianus*, and the skull is a little smaller and lighter than that of *merriami* and scarcely distinguishable from that of *texianus*. The color of back and general appearance of this animal is that of a dark-colored *L. merriami* with extraordinarily large ears and no black nape patch. Its habitat is at the southern border of that of *L. m. asellus* and widely separated from that of *L. texianus*.

Lepus merriami altamiræ subsp. nov.

ALTA MIRA JACK RABBIT.

Type No. 93,691, adult male, U. S. National Museum, Biological Survey Collection. From Alta Mira, Tamaulipas, Mexico. Collected May 16, 1898, by E. W. Nelson and E. A. Goldman. Original number 12,365.

Geographic distribution.—Coastal plains in southern part of Tamaulipas, extreme northern Vera Cruz, and eastern San Luis Potosi.

Zonal distribution.—Arid tropical.

Subspecific characters.—Similar to typical *merriami* in color, but under side of neck deeper and clearer buffy, and black nape patch distinctly separated into two parallel black stripes by a well-defined median band of yellowish

often equalling black bands in width; skull larger and heavier, with longer rostrum than in *L. merriami*.

Description of type in rather worn spring pelage.—Top of head grizzled grayish buffy; back dull creamy buffy grizzled and mottled with overlying black tips to hairs; sides of body slightly paler buffy grizzled with grayish; thighs and sides of rump up nearly to median line of back rather pale iron gray; top of fore feet and legs dingy buffy; top of hind feet white; top of tail and narrow line extending forward along middle of rump black; under side of tail grayish white; sides of head, with sides and under part of neck, bright buff, with some black grizzling on sides of head; nape with a narrow black band extending back from base of each ear with a median band of buffy of equal width separating the two black bands; ear on front half of convex surface grizzled yellowish buffy and bordered along edge by a fringe of buffy hairs; posterior half of convex surface blackish at base and shading into grayish white on middle and pure white on terminal part, which lacks any sign of a black margin or tip; posterior border of ear buffy on basal half; white along rest of margin (pure on convex side, shaded with buffy on concave side) to near tip, which is buffy.

Skull characters.—Skull much as in typical *L. merriami*, but longer and rather heavier, with longer and heavier rostrum.

Measurements of type (taken in flesh).—Total length, 605; tail vertebræ, 96; hind foot, 137; ear from notch (from dried skin), 112.

Measurements of type skull.—Occipito-nasal length, 99; basal length, 77; length of nasals, 44; greatest interorbital breadth, 24; parietal breadth, 32; depth of rostrum at front base of premolar, 26; width above same point, 26; greatest diameter of bullæ, 12.

Specimens examined.—Six.

General notes.—This form agrees with typical *L. merriami* in general appearance, but in five out of six specimens examined the black nape patch is divided by a distinct yellow band. The under side of the neck is much deeper buffy, and the tips of the ears on the convex side entirely lack any trace of black in three specimens and have only a narrow black edging in the three others examined. The larger skull with longer, heavier rostrum is another character. It has a comparatively limited distribution, and occupies the southernmost area occupied by the species along the Gulf coast of Mexico, and probably does not range as far north as Victoria, Tamaulipas.

Vol XVII, pp. 111-112. May 18, 1904.

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON TETRANEURIS LINEARIFOLIA.

BY T. D. A. COCKERELL.

Tetraneuris linearifolia (Hooker) Greene.

This species is certainly very variable, both as to its mode of growth and the width of the leaves. How far these differences are racial it is hard to say. The specimens seen are as follows:

Texas.—Kerrville, Kerr Co. (Heller); "Texas" (Lindheimer, 267); "On the Pierdenales" (Lindheimer); Leona (Wright); "Pecos, etc." (Wright); Brazos (Lindheimer); Dallas (Elihu Hall); near New Braunfels (Lindheimer); Gillespie Co. (G. Jermy); Dallas (Reverchon); San Antonio (E. H. Wilkinson); Dallas (B. F. Bush). The Lindheimer plants have very narrow leaves, and are no doubt typical. The Heller plant from Kerrville (Heller, 1619; hb. Mo. Botanical Garden) has larger heads (over 25 mm. diam. with rays, and about 12 without), dark olive-green almost entirely glabrous foliage, some of the leaves as much as 5 mm. broad, and strongly striate practically glabrous stems. The involucres and peduncles beneath are covered with ochreous hair. The plant has a spreading bushy growth, and is about 25 cm. high, counting the heads. This plant grows in "rich and often shaded ground" (Heller, Bot. Expl. So. Tex., p. 109), whereas Lindheimer's plant grows "in masses together on sandy prairies, with thin soil" (Lindheimer, 648). Whether the Kerrville plant represents a "form" or a true race, can not be certainly determined at present, but the latter would seem rather probable, or Heller would have found both states. It may be called var. *latior* (type, Heller's 1619).

Oklahoma.—Huntsville, Kingfisher Co. (Laura A. Blankinship). Small plants; lowest leaves broad.

Kansas.—Sumner Co. (Mark White). Bushy; leaves narrow.

Tetraneuris linearifolia oblongifolia (Greene)

Tetraneuris oblongifolia, Greene, Pittonia, iii, 269. (1898.)

I have before me Palmer's No. 677, from the State of Nuevo Leon. The heads are about 10 mm. broad (excl. rays), the rays large and broad; the leaves are up to about 3½ mm. broad, and quite hairy; the achenes, pappus, etc., are as in *linearifolia*. I do not think this can well rank as a species.

Tetraneuris linearifolia dodgei subsp. nov.

About 25 cm. high, with several stems; very hairy, the young leaves enveloped in loose tomentum; heads (excl. rays) about 13 mm. broad; *radical leaves pinnatifid with broad lateral lobes* diverging at right angles from the rather broad blade; cauline leaves short and mostly quite narrow; aristæ of pappus longer than in *linearifolia* or *oblongifolia*. Monterey, Mexico, "in fields, very common," May, 1891. (Chas. K. Dodge, 109; U. S. N. M., 27,471.) The heads on long upright peduncles look like those of *oblongifolia*, but the foliage is quite different. This ought perhaps to be regarded as a valid species, but I expect that intermediates between it and *linearifolia* will be found.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW SUBSPECIES OF TROPICAL AMERICAN TYRANT BIRDS.

BY OUTRAM BANGS.

Of the two tyrant birds here named as new subspecies, one is a well-marked form of *Serphophaga cinerea* (Strickl.) from the Santa Marta region of Colombia, formerly referred by me to *S. cinerea grisea* Lawr. The other is the extreme northern form of the wide ranging *Todirostrum cinereum* (Linn.), from southern Mexico. Fortunately the type locality of *T. cinereum*—Surinam—is well toward the southern end of the range of the species, and extreme northern and southern specimens when compared together are different enough. A long chain of intergrades, however, through Central America and Panama completely connects the two extreme races and it is no easy matter to say which name many of these should bear. Roughly speaking, specimens from Honduras north may be referred to the northern form and those from Panama south to the southern.

Serphophaga cinerea cana subsp. nov.

Type from Chirua, Sierra Nevada de Santa Marta, Colombia, 7000 feet altitude, adult male No. 6125, coll. of E. A. & O. Bangs, collected March 17, 1899, by W. W. Brown, Jr.

Characters.—Most like *S. cinerea grisea*, but head dull brownish-black, with very large and conspicuous semi-concealed patch of white on crown; back very pale smoke gray; under parts nearly uniform grayish white—

the breast and sides but little grayer than the throat and belly; wing bars and edging of tertials much paler gray-whitish.

S. cinerea grisea of Costa Rica and Chiriqui has the head deep black, the white patch on crown small, the back cinereous almost without brownish tinge, the breast and sides dark gray—much darker than the throat and belly—and the wing bars and edging of tertials dark gray.

S. cinerea cinerea from Peru and eastern Ecuador (type locality supposed to be Chili) has the back much browner and slightly darker gray, and the under parts much grayer.

MEASUREMENTS.

No.	Sex.		Wing.	Tail.	Tarsus.	Exposed culmen.
6125	♂ ad.	Chirua, 7000 feet	56.	43.	16.6	10.2
6127	♂ ad.	La Concepcion, 3000 feet.	55.5	40.5	16.8	9.8
6128	♀ ad.	" " " "	50.	39.5	16.2	9.6
6126	♀ ad.	San Miguel, 7500 feet. *	51.	41.	16.4	——

* All these places are in the Sierra Nevada de Santa Marta, Colombia.

Todirostrum cinereum finitimum subsp. nov.

Type from San Juan Bautista, Tabasco, Mexico, adult male No. 4148, coll. of E. A. & O. Bangs, collected March 7, 1890.

Characters.—Similar to true *T. cinereum* of Guiana and southeastern Brazil, except in being darker yellow below, lemon yellow or canary yellow instead of sulphur yellow, and much darker above—the back dull, dark olive-green with faint dusky striations, lacking the grayish or cinereous tinge of these parts in true *T. cinereum;* in the new form there is gray only on the nape where the black of the cap fades into the green of the back and here the gray is much darker than in true *T. cinereum.*

MEASUREMENTS.

No.	Sex.		Wing.	Tail.	Tarsus.	Exposed culmen.
4148	♂ ad.	Type	41.	32.	18.4	13.8
4147	♂ ad.	Topotype	41.	31.	18.2	——
4149	♀ ad.	"	40.5	31.5	18.	13.6

Vol. XVII, pp. 115-118 May 19, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ADDITIONS TO THE ORCHID FLORA OF FLORIDA.

BY OAKES AMES.

The orchid floras of peninsular Florida and of the West Indies are so similar in the genera and species common to both that it is not surprising to find, among recent additions to the list of Florida orchids, species known to be natives of Cuba, Porto Rico, and Jamaica. During November and December, 1903, six genera new to Florida, including seven species, were discovered by a single collector in Dade County. Most of these were found in abundance and, as careful comparisons showed, were identical with genera and species known to come from Cuba and Jamaica. One species proved new to science, but in February, 1904, was discovered by myself in the Province of Pinar del Rio, near the town of Artemisa, forty miles west of Havana. In March, 1904, while on the west coast of Florida about eighty miles from the end of the Peninsula, I found among other orchids three species up to that time unrecorded from the United States, one of them belonging to a genus new to Florida. Of all of them I had collected specimens previously in different parts of Cuba, one frequently in Pinar del Rio province. At the present time, with the exception of *Epidendrum tampense* Lindl. and *E. conopseum* R. Br., there is no epiphytic orchid known to occur in Florida which has not also been reported from Cuba and other parts of Tropical America, while the same may be said of many of the terrestrial species; a fact which

shows quite plainly that the West Indies must be reckoned with to a large extent in the study of our semi-tropical orchid flora.

The following list contains six species hitherto unrecorded as natives of the United States. Two of them, however, on account of inadequate material are here reported on provisional, though reasonably sure, determinations. One, *Liparis elata*, was received in 1903 from Lee County, Florida, where it was collected by the late James E. Layne. No data accompanied the specimens, which were in a fresh state, one of them pushing up a flower shoot that failed to reach maturity. The other species, *Pelexia setacea*, was collected by Mr. A. A. Eaton in Dade County. When received, Mr. Eaton's plants were partly frozen so that the flowers ceased developing. From the buds, however, analyses were made that showed characters on which the following determination is based. Of the remaining species, three were collected by me on the west coast of Florida and one by Mr. Eaton near Miami, on the east coast.

Ionopsis utricularioides Lindl.

On low trees near pools of water. Found only in "Gobbler's Head," near Naples, Lee County, the flowers just opening. March 12 (*O. A.*).

Epidendrum strobiliferum Rchb. f.

On the lower limbs of *Persea carolinensis* Nees., in "Palm Hammock," near Marco. Only one station; the plants in fruit. March 19 (*O. A.*).

Epidendrum anceps Jacq.

Common on deciduous trees, almost everywhere, not infrequently forming the main epiphytic orchid flora round muddy "lakes" in cypress swamps; Lee County, March 15–21 (*O. A.*).

Pelexia setacea Lindl.

In humus, in the dense shade of hammocks, fourteen miles south of Cutler, Dade County, Dec. 10, 1903 (*A. A. Eaton*). My specimens agree perfectly with *P. setacea*, except for the spur, but the immaturity of my material may well account for discrepancies in this respect, as the spur must lengthen considerably as the flower develops.

Liparis elata Rchb. f.

Lee County, July, 1903 (*J. E. Layne*).

Sauroglossum cranichoides n. comb.

(*Pelexia cranichoides* Grisebach, Cat. Plant. Cubensium, 1866, p. 269; *Spiranthes storeri* Chapman, Flora of the Southern United States, 1897, p. 488; *Beadlea storeri* Small, Flora of the Southeastern United States, 1903, p. 319.)—In humus in the deep shade of Breckell Hammock, near Miami, Dade County, Dec. 23–28, 1903 (*A. A. Eaton*). This is undoubtedly the species described by A. W. Chapman as *Spiranthes storeri* in 1897, and later placed by Dr. J. K. Small in a new genus as *Beadlea storeri*. Tracings of the floral organs and of the plant, taken from the type material of *Beadlea* in the herbarium of the New York Botanical Gardens, agree perfectly with the specimens collected by Mr. Eaton and with *Pelexia cranichoides* Grisebach. Dr. Small described *Beadlea* as without callosities at the base of the lip, but this was an oversight, as later investigations showed the presence of two callosities, much the same as in *Spiranthes*. In referring the species in question to *Pelexia*, A. H. R. Grisebach must have interpreted the characters of that genus rather loosely, as the flowers on the plants which he described lack the characteristic spur of *Pelexia* and do not agree with it in several other important respects. The nearest affinity of *Sauroglossum cranichoides* seems to be *S. elatum* (Rich.). From both species *Sauroglossum elatum* Lindl. is distinct, so that it seems best to revive the first specific name of this plant, which would eliminate the likelihood of confusion and give as a new combination *Sauroglossum nitidum* (Vell).

Vol. XVII, pp 119-120 June 9, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THREE NEW ORCHID SPECIES.

BY OAKES AMES.

The three species of orchidaceous plants described below have been for some time the cause of much perplexity, as I have been unable to refer them to species hitherto published. The *Dendrobium* was given to me by Mr. F. Sander, of St. Albans, England, who received it from New Guinea, where it was collected by Micholitz. The only information concerning the specimen referred to the color of the flowers and to the probability of there being a variety characterized by "purple" veins on the perianth. The two *Epidendrums* were collected in Mexico by Mr. C. G. Pringle and are interesting additions to a complex genus. To Mr. R. A. Rolfe, who kindly examined the specimens and on finding them worthy of specific rank described them, I owe my best thanks.

Dendrobium Micholitzii Rolfe.

"Densely tufted; pseudobulbs erect, slender at the base, somewhat thickened upwards and quadrangular, 3–4 inches long, diphyllous at the apex; leaves oblong or obvate-oblong, obtuse, coriaceous, $1\frac{1}{4}$–$2\frac{1}{4}$ inches long; flowers terminal, several, from the axils of a cluster of imbricating oblong bracts, creamy yellow with a greenish orange blotch on the lip, sometimes with purple veins on the flower; pedicels slender, 8–10 lines long; dorsal sepal oblong lanceolate, acute, $2\frac{1}{2}$ lines long; lateral pair triangular, acute, prolonged behind into a stout obtuse somewhat curved mentum $4\frac{1}{2}$–6 lines long; petals linear, acute, $2\frac{1}{2}$ lines long; lip 5–6 lines long, the basal part oblong and somewhat curved, the apex dilated into an obovate obtuse limb, bearing a small oblong crest in the centre; column stout, scarcely over $\frac{1}{2}$ line long.—German New Guinea, Micholitz.

"An interesting addition to the small section *Bolbodium*, allied to *D. pumilum* Roxb., but far larger in all its parts, and the pseudobulbs distinctly quadrangular upwards, as in the Burmese *D. quadrangulare* Parish, which, however, has smaller flowers and a proportionately shorter mentum. The remaining species is the Philippine *D. hymenanthum* Rchb. f." Type in herbarium of the Ames Botanical Laboratory.

Epidendrum Pringlei Rolfe.

"Densely tufted; pseudobulbs ovoid-oblong, 7–10 lines long, 1–2-leaved; leaves linear-oblong, subobtuse, coriaceous, 2–3 inches long; scapes slender, erect, 2½–4 inches long, 1–2-flowered; bracts ovate, apiculate, 1 line long; pedicels 6–8 lines long; sepals broadly lanceolate, acute, 5 lines long, reflexed; petals linear-lanceolate, acute, 5 lines long, reflexed; lip free from column, very shortly stalked, limb dilated into a transversely oblong or suborbicular blade, about 5 lines long by 7 broad, thickened at the base into a two or three-keeled callus from which three slender nerves extend toward the apex; column 2 lines long, broadly clavate.—Mexico, State of Morelos, near Cuernavaca, on tops of mountains, at 8,000 ft. altitude; C. G. Pringle, May 12, 1898.

"A species of the *Encyclium* section, nearly allied to *E. hastatum* Lindl., but more slender and smaller in all its parts. The sepals and petals are somewhat fleshy, and appear to have been dusky brown in colour, while the limb of the lip is membranaceous and white. Of known species it can only be compared with the one mentioned, but it is well characterised by its very slender habit." Type in herbarium of the Ames Botanical Laboratory.

Epidendrum oaxacanum Rolfe.

"Stems erect, subterete, leafy, 1¾–2¼ ft. high; leaves oblong, subobtuse, coriaceous, 3–4 inches long, ¾–1 inch broad; inflorescences terminal and axillary on the upper part of the stem, somewhat branched, aggregated into a loose head 2½–3 inches long, covered with lanceolate-oblong imbricating striate sheaths at the base; bracts triangular-ovate, acute or acuminate, 1½–2 lines long; pedicels 5–7 lines long, slender; dorsal sepal narrowly spatulate-lanceolate, subobtuse, lateral pair rather broader, all more or less convolute, 5–6 lines long; petals narrowly spatulate-linear, subobtuse, 5–6 lines long; lip adnate to the column, limb three-lobed, 5 lines broad; front lobe ovate-oblong, obtuse, with three prominent erect keels; side lobes spreading, broadly oblong, obtuse, with about five thickened veins; lobes about 2 lines long; disc bearing a pair of broadly oblong crests near the base of the side lobes; column clavate, 4 lines long.—Mexico; State of Oaxaca, Sierra de San Filipe, at 7,500 ft. altitude; C. G. Pringle, Nov. 19, 1894, n. 5830.

"An interesting addition to the small section *Acropleuranthium*, characterised by having both terminal and axillary inflorescences, of which *E. exasperatum* Rchb. f. and *E. Wallisii* Rchb. f. have hitherto been the known representatives. It is very distinct from either and from the dried specimens appears to have yellowish green flowers." Type in herbarium of the Ames Botanical Laboratory.

Vol. XVII, pp. 121-122 June 9, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW SPECIES OF BLIND EEL, OF THE GENUS *ANGUILLA*.

BY HUGH M. SMITH.

[Contribution from U. S. Bureau of Fisheries.]

On July 31, 1902, during a cruise of the schooner *Grampus* to the tile-fish grounds lying on the inner edge of the Gulf Stream, the writer collected at the surface, 60 miles south of Nomans Land, a small eel which represents a hitherto unknown species of *Anguilla*, and is here diagnosed and figured.

Anguilla cæca Smith, new species.

Similar to the common eel, *Anguilla chrisypa* Rafinesque, but with the head and snout somewhat broader, the mandible longer and more projecting, the eyes completely covered by skin and the body uniformly black. Body cylindrical anteriorly, compressed posteriorly, the depth contained 2.7 times in length of head; head about .12 total length; mouth large, lower jaw strongly projecting; teeth small, in a band in each jaw, a small patch also on vomerine; anterior nostrils tubular, posterior nostrils simple pits in front of eye; a large pore on each side half-way between nostrils, and a row of large pores on each side of lower jaw; branchial aperture vertical, about length of base of pectoral, extending below base of pectoral; pectoral fins well developed, .25 length of head; dorsal origin posterior to gill-opening a distance equal to 1.6 length of head; anal origin posterior to dorsal a distance equal to .66 length of head. Scales not evident. Skin uniformly jet black; fins dark reddish brown by transmitted light; skin over eyes not appreciably thinner than elsewhere. Eyes about as large as

those of common eel of same size and placed posterior to the angle of the mouth, their position indicated by a slight elevation.

The type, 6 cm. long, has been deposited in the United States National Museum, and is numbered 51,483 on the fish register.

From the foregoing description it will be seen that this species closely resembles *A. chrisypa*. Comparing it with a specimen of the common eel of the same size, of the pale, translucent type, taken from a tributary of Casco Bay, Maine, May 13, 1903, the most striking differences, besides the absence of functional eyes, are in the length of the lower jaw and the location of the eyes posterior to the angle of the mouth, as shown in the accompanying figures of these two specimens.

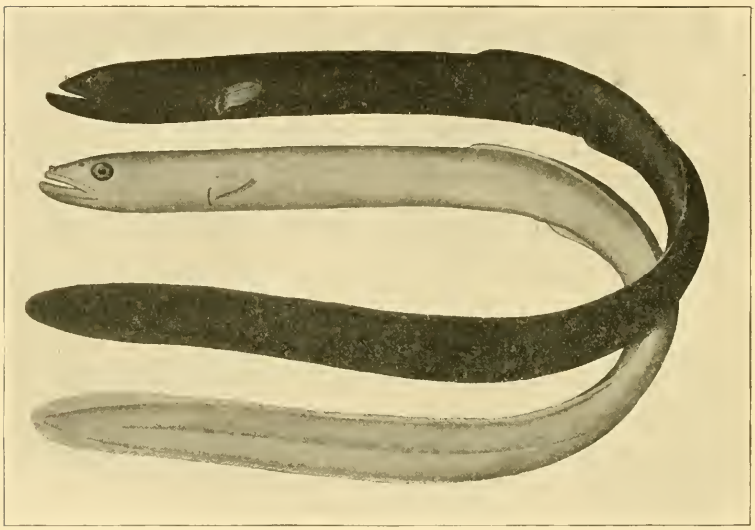

FIG. 1. Comparison of type of *Anguilla cæca* Smith (upper figure) with specimen of *Anguilla chrisypa* Rafinesque (lower figure) of same size.

Although this fish was found at the surface, in a locality where the water was about 50 fathoms deep, it is evident that it is a bottom species, and that the type was a stray.

Vol. XVII, pp. 123-126 June 9, 1904.

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FOUR NEW GRASSHOPPER MICE, GENUS *ONYCHOMYS*.

BY C. HART MERRIAM.

Among the large series of grasshopper mice in the collection of the Biological Survey are four forms which appear to require recognition by name. Three of these belong to the small *torridus* group; the fourth to the much larger *leucogaster* group. The new forms may be known from the following descriptions:

Onychomys torridus tularensis subsp. nov.

Type from Bakersfield, Kern County, Calif. Adult female, No. $\frac{29711}{41786}$, U. S. National Museum, Biological Survey Collection. July 19, 1891. A. K. Fisher. Orig. No. 792.

Characters.—Size small; color pale drab gray, barely tinged with buffy. Similar to *O. torridus longicaudus* but much paler and without the ochraceous suffusion. Compared with *O. ramona* the difference is still more marked, *ramona* being a very dark form. The type specimen has just moulted the hair of the face and head and as a result the new pelage on these parts is darker than usual.

Range.—The Tulare basin from Huron and Alcalde south, and adjacent Carrizo Plains on the west and Kern Valley on the east.

Measurements.—Average of 5 adults: Total length, 143; tail vertebræ, 50.5; hind foot, 21.

Onychomys torridus yakiensis subsp. nov.

Type from Camoa, Rio Mayo, southern Sonora, Mexico. Adult female, No. 95,855, U. S. National Museum, Biological Survey Collection. Oct. 28, 1898. E. A. Goldman. Orig. No. 13,158.

Characters.—Color similar to that of *Onychomys torridus ramona*, but size slightly larger (hind foot averaging 22.5 instead of 20.5). Median dorsal area, from crown to base of tail, usually much darker than sides of back. Compared with *torridus*, *longicaudus*, and *ramona*, the molar teeth, particularly the anterior molars, are broader and heavier, and the palate usually ends posteriorly in a median projection—in *torridus* and *ramona* it is concave.

Measurements.—Type specimen: Total length, 154; tail vertebræ, 53; hind foot, 22. Average of 6 specimens from type region: Total length, 149; tail vertebræ, 53; hind foot, 22.5.

Remarks.—*Onychomys yakiensis* has the dark head, large ears, and general coloration of *ramona*, in which respects it differs from typical *torridus*. Its range appears to be western Sonora and northern Sinaloa, and may join that of *ramona* around the head of the Gulf of California. The collection of the Biological Survey contains 19 specimens of this form from Camoa and Alamos, Sonora, and Sinaloa, Sinaloa. The series comprises both pelages (grayish brown and dull fulvous) and various ages. The young when half grown are dark gray like those of *ramona;* when nearly full grown they are pale smoke gray, much paler than *ramona* of corresponding age.

Onychomys torridus canus subsp. nov.

Type from San Juan Capistrano, Zacatecas, Mexico. Adult female, No. 90,843, U. S. National Museum, Biological Survey Collection. Aug. 23, 1897. E. W. Nelson and E. A. Goldman. Orig. No. 11,574.

Characters.—Similar to *torridus* in general characters, but tail and ears longer, and color drab gray or grayish clay-color instead of fulvous.

Measurements.—Type specimen: Total length, 152; tail vertebræ, 55; hind foot, 22. Average of 5 specimens from type locality: Total length, 150; tail, 54; hind foot, 22.

Remarks.—In addition to the Zacatecas specimens, others are at hand from Rio Verde and Jesus Maria, San Luis Potosi.

Onychomys leucogaster albescens subsp. nov.

Type from Samalayuca, Chihuahua, Mexico. Adult female, No. 50,040, U. S. National Museum, Biological Survey Collection. Dec. 12, 1892. C. P. Streator. Orig. No. 2399.

Characters.—Size large. Similar to *O. leucogaster pallescens* from Hopi Pueblos of Arizona, but much paler, and with cheeks and thighs snowy-

white. Upperparts buffy, deepest on rump; face from nose to eyes whitish, faintly washed with buff; *cheeks, legs, and thighs snow-white* like underparts.

Skull, compared with that of *pallescens*, smaller and weaker, braincase narrower, more rounded (less flattened on top); rostrum weaker; zygomata much narrower and rounded off anteriorly, slightly spreading posteriorly. [In *pallescens* as in *leucogaster* they stand out much farther and more squarely, enclosing a much larger orbital fossa.]

Measurements.—Type specimen: Total length, 160; tail vertebræ, 60; hind foot, 23.

Remarks.—The type specimen, which is in fresh winter pelage, has long soft fur and is the most beautiful mouse I have ever seen. With it are two young-adults, not quite full grown, from the same locality. One of these is like the type, only not quite so pale; the other has the upperparts pale smoke-gray slightly suffused with buffy.

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Vol. XVII, pp. 127-128 June 9, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW POCKET MICE OF THE GENUS *PEROGNATHUS*.

BY WILFRED H. OSGOOD.

Several hundred specimens of pocket mice have been secured by field parties of the Biological Survey since the publication of the last revision of the genus *Perognathus*.* Among these are many which serve to increase the knowledge of the distribution and relationships of the various species and subspecies. The new material also indicates that two well-marked subspecies are still unnamed. They may be known as follows:

Perognathus flavescens perniger subsp. nov.

Type from Vermilion, South Dakota. Young-adult female, No. 57,725, U. S. National Museum, Biological Survey Collection. Aug. 22, 1889. G. S. Agersborg.

Characters.—Size, proportions, and skull much as in *P. flavescens;* color of upperparts chiefly intense black; underparts chiefly ochraceous buff.

Color.—Median dorsal region intense black or brownish black to roots of hairs; sides and head mixed black and ochraceous buff; ears brownish black very narrowly edged with buffy; inferior subauricular spot bright buff, superior one nearly obsolete; lateral line ochraceous buff, broad and sharply contrasted; underparts rich ochraceous buff except chin and a narrow stripe on throat and breast, which are white; tail dusky above, whitish below, narrowly buffy on sides; feet buffy, toes paler.

Skull.—As in *P. flavescens.*

Measurements.—Type: Total length, 140; tail vertebræ, 68; hind foot (dry), 17.

* *North American Fauna*, No. 18, September 20, 1900.

Remarks.—The type of this subspecies has been in the collection of the Biological Survey for a number of years. It has heretofore been doubtfully referred to *flavescens* on the assumption that its very dark color was due to melanism or other abnormal condition. Apparently this is not the case, for a second specimen from Vermilion, South Dakota, while quite immature, shows the same dark color, and two adults from Verdigris, Nebraska, are distinctly intermediate. One of these, collected April 23, 1903, by Merritt Cary, has decidedly more dusky than is usual in *flavescens*, and has the posterior half of the underparts almost entirely buff. The other, collected by V. Bailey, June 11, 1893, is more like *flavescens* in the color of the upperparts, but has the buffy suffusion on the belly. The specimens from Vermilion, South Dakota, seem to represent an extreme development of these characters. Typical *flavescens* invariably has pure white underparts, and except in very high pelage is quite pale throughout. Its home is in the sand hills of Nebraska, where conditions are decidedly different from those in the more humid region inhabited by *perniger*.

Perognathus californicus ochrus subsp. nov.

Type from Santiago Springs (16 miles southwest of McKittrick), Kern County, California. Young-adult female, No. 130,348, U. S. National Museum, Biological Survey Collection. July 30, 1903. Luther J. Goldman.

Characters.—Similar to *P. californicus dispar*, but decidedly paler.

Color.—Upperparts mixed pinkish buff and dusky, producing a general effect varying from ecru drab to broccoli brown; lateral line pale pinkish buff; underparts creamy white; tail hair brown above, white below; hands and feet white.

Skull.—As in *P. c. dispar*.

Measurements.—Average of 10 young-adult topotypes: Total length, 200 (190–216); tail vertebræ, 108.7 (100–119); hind foot, 25.

Remarks.—This pale form of *P. californicus* seems to be confined to the region about the lower end of the San Joaquin Valley. The palest specimens are those from localities nearest the bottom of the valley. Specimens from Tehachapi and Old Fort Tejon show a slight approach to *dispar*, to which they were formerly referred. A series from Three Rivers, Kern County, is typical of *dispar*, which seems to indicate that the range of this form is interrupted in the passes at the foot of the San Joaquin Valley by the paler form *ochrus*. *P. c. dispar* is itself slightly paler than *californicus*, but the principal reason for recognizing it is its larger size and cranial characters. Should these cranial characters prove inconstant on the acquisition of larger series of true *californicus*, *dispar* would fall as a synonym of *californicus*. In any case the form here called *ochrus* would merit recognition.

Specimens examined.—Total number, 65, from localities in California as follows: Alcalde, 1; Carrizo Plains, 1; Cayama Valley, 3; Fort Tejon, 2; 25 miles above Kernville, 1; Onyx, 4; Painted Rock, 25 miles southeast of Simmler, 1; San Emigdio, 4; San Emigdio Canyon, 5; Santiago Springs, 16 miles southwest of McKittrick, 36; Tehachapi, 2; Tejon Canyon, 5.

VOL. XVII, PP. 129-130 JUNE 9, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

BIOLOGICAL

TWO NEW SQUIRRELS OF THE *ABERTI* GROUP.

BY C. HART MERRIAM.

Mr. John T. Stewart has recently sent me two specimens of a new squirrel collected by him in the pine forest on the Kaibab Plateau in northern Arizona. One of these, a female, was obtained in August; the other, a male, in December. They agree in essential characters and differ strikingly from the well known Abert squirrel of the pine forest of the Arizona plateau south of the Grand Canyon. Mr. Stewart, while at work with a field party of the U. S. Geological Survey on the north side of the Grand Canyon, saw seven and obtained four of the new squirrels; he found them scarce and wild.

In addition to the above-mentioned species the Biological Survey collection contains a number of specimens of a pale form of the Abert squirrel from the south end of the Cimarron Mountains in northeastern New Mexico, mainly from the neighborhood of Hall Peak. Both of these are here described.

Sciurus kaibabensis sp. nov.

Type from head of Bright Angel Creek, top of Kaibab Plateau, north side of Grand Canyon of Colorado, Arizona. Adult male, No. 130,982, U. S. National Museum, Biological Survey Collection. December 1, 1903. John T. Stewart.

Characters.—Similar in size and general characters to *S. aberti*, but under-

parts *mainly black* instead of white, and tail mainly *white all over* instead of white on under side only.

Color.—Upperparts from nose to base of tail dark grizzled gray, considerably darker than in *aberti;* back with a ferruginous dorsal area extending from shoulders to rump, and sometimes reaching anteriorly to top of head as in *aberti;* lower sides, upper part of fore legs, and thighs, mainly solid black; median parts below, from mouth to base of tail, black mixed with gray; ears in summer blackish (in *aberti* gray), in winter anterior fold gray, tufts black; tail white, except extreme base, which is gray, and an indistinct streak along the middle of upper side, which is dark buffy gray, ending in a subterminal blackish band; nose black; face (including cheeks and sides of nose), fore feet, and toes finely mixed gray and black; hind feet in summer mainly gray, in winter mainly black.

Sciurus aberti mimus subsp. nov.

Type from Hall Peak, at south end of Cimarron Mountains, northeastern New Mexico. Adult female, No. 70,908, U. S. National Museum, Biological Survey Collection. January 16, 1895. C. M. Barber. Original No. 61.

Characters.—Similar to *S. aberti*, but gray of upperparts decidedly paler; red dorsal area usually obsolete or nearly so; upper side of tail paler; ear tufts pale fulvous, grizzled and tipped with black (instead of mainly black); tail apparently shorter.

Measurements of type specimen.—Length, 485; tail vertebræ, 215; hind foot, 70.

Vol. XVII, pp. 131-134 July 14, 1904.

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

JACK RABBITS OF THE *LEPUS CAMPESTRIS* GROUP.

BY C. HART MERRIAM.

The large white-tailed jack rabbit of the Northern Plains was named *Lepus campestris* by Bachman in 1837. The type specimen came from the plains of the Saskatchewan. Two years later (1839) he described, under the name *Lepus townsendi*, a closely related species from Walla Walla, on the plains of the Columbia. Waterhouse, in 1848, united the two, placing *townsendi* as a synonym under *campestris*. This course has been followed by subsequent naturalists.

An examination of the jack rabbits of this group in the collection of the U. S. Biological Survey shows that *townsendi* is a strongly marked form of the *campestris* group, and that another form, heretofore unrecognized, but here named *sierræ*, inhabits the Sierra Nevada of California. The three forms, with their ranges so far as now known, may be defined as follows:

Lepus campestris Bachman.

Lepus campestris Bachman, Journ. Acad. Nat. Sci., Phila., VII, Pt. 2, 349-352, 1837.

Type locality.—Plains of Saskatchewan.

Range.—Northern Great Plains from Plains of Saskatchewan southward to Kansas, and from Minnesota westward to the Rocky Mountains. From

Green River Basin in southwestern Wyoming the range spreads westerly over eastern Idaho, northern Utah, and northeastern Nevada.

Characters.—Upperparts yellowish gray; thighs grayish, washed with fulvous, becoming snow-white in early fall; tip of ear margined anteriorly by black, posteriorly marked by a broad squarish black patch changing abruptly to the white below; tail wholly snow-white, some specimens showing a faint trace of a median dorsal line; upper surface of fore leg and fore foot ochraceous, sparingly sprinkled with black hairs; eye surrounded by a broad conspicuous white ring; top of head and front of ears yellowish gray or buffy yellowish, varying to buffy fulvous; pectoral collar buffy yellowish.

Measurements.—Average of 5 specimens from Wyoming: Total length, 615; tail vertebræ, 92; hind foot, 152.

Lepus campestris townsendi Bachman.

Lepus townsendi Bachman, Journ. Acad. Nat. Sci., Phila., VIII, Pt. I, 90-94, 1839.

Type locality.—Walla Walla, Washington.

Range.—Plains of the Columbia, in Oregon and Washington.

Characters.—Upperparts clear gray; thighs and hind legs deep gray; tip of ear not bordered anteriorly by black, the black showing along the edge only; posterior ear-patch narrow, forming only a border, which fades out irregularly into gray below and on the inner side; tail white, with a distinct gray median dorsal line or stripe; top of fore leg and fore foot buffy gray, strongly grizzled with black hairs; white ring around eye not conspicuous, the part below the eye indistinct; top of head and front of ears gray or only faintly tinged with pale buffy fulvous; pectoral collar buffy gray.

Measurements.—Average of 5 from plains of Columbia: Total length, 576; tail vertebræ, 81; hind foot, 147.

Lepus campestris sierræ subsp. nov.

Type from Hope Valley, Alpine County, California, altitude 7800 feet. No. 67,863, female, U. S. National Museum, Biological Survey Collection. September 9, 1894. F. Stephens. Original No. 1889.

Range.—In summer, the Sierra Nevada from Lake Tahoe southward to south of Mono Lake; in winter, adjacent sage-brush slopes on east side of Sierra in Nevada and California.

Characters.—Size large; hind foot exceedingly long (167 mm.); weight of type specimen, 8¼ lbs. Similar in general to *townsendi*, but feet much larger and ears broadly tipped with black on both sides, more broadly even than in *campestris*, the black covering the tip of the anterior or upper fold in front as well as behind, and forming a large rectangular patch behind; back, thighs, and pectoral collar gray, as in *townsendi;* upper side of tail

with a conspicuous broad gray median band, tapering to a point and disappearing before reaching tip; white ring around eye broad and conspicuous above and behind the eye, narrow below posteriorly, disappearing anteriorly; upper lip and sides of nose, including patch at base of whiskers, intense buffy fulvous; pectoral collar and flanks gray, the gray of flanks encroaching on belly; top of fore legs grizzled buffy fulvous; wrists and fore feet dirty yellowish white; hind feet white.

Remarks.—The latter part of September, 1900, John Muir and I, after ascending Bloody Canyon to Mono Pass, came upon one of these large hares among the Murray and white bark pines on the west side about two miles below the Pass, and near Dana Creek, which is one of the heads of Tuolumne River. The Paiute Indians at Mono Lake showed me a number of snow-white winter skins of this rabbit, and told me that in winter it comes out of the mountains and inhabits the higher sage-brush slopes on upper Rush Creek, from which locality the Biological Survey has recently secured specimens, through the courtesy of Will J. Farrington, of Mono Lake. All of these specimens unfortunately are in the white winter pelage, though most of them show some dark gray on the head and some pale fulvous on the ears, nose, and fore feet. The ears are strongly washed with pale fulvous. The ear-tips are black on both sides, but the black area is not so large as in the specimen in summer pelage from Hope Valley. In typical *campestris* also the black ear-tips are smaller in winter than in summer.

Measurements.—Type specimen: Total length, 635; tail vertebræ, 112; hind foot, 167.

Vol. XVII, pp. 135-138 July 14, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

UNRECOGNIZED JACK RABBITS OF THE *LEPUS TEXIANUS* GROUP.

BY C. HART MERRIAM.

The *texianus* group of jack rabbits comprises a number of species and subspecies inhabiting the western part of North America from the State of Durango in Mexico north to South Dakota and the Columbia River, and from middle Texas west to the coast region of California. One of these, *Lepus texianus deserticola* Mearns, occupies the Colorado and Mohave deserts and the desert region generally east of the High Sierra.

Another subspecies inhabits the Plains of the Columbia in Oregon and Washington. It resembles *deserticola*, but is much darker, and may be distinguished by other characters pointed out in the accompanying description. It is here named *Lepus texianus wallawalla*.

In the interior of California, west of the Sierra, three forms occur:

(1) *Lepus californicus* Gray, 1837. A large, highly-colored, reddish brown or fulvous species, inhabiting the coast region from San Diego northward, spreading over the Sacramento Valley and foothills of the northern Sierra, and continuing over Shasta Valley to the Rogue River and Willamette Valley in Oregon. Type locality, San Antonio, Calif., doubtless the old Mission of that name a few miles north of Jolon, Monterey County.

(2) *Lepus richardsoni* Bachman, 1839. A form resembling *californicus*, but slightly smaller and much paler in color, lacking the reddish suffusion, the general tone of the upperparts being buffy grayish instead of reddish brown. This form inhabits Salinas Valley and bordering ranges on both sides, follows the mountains around the south end of the Joaquin Valley, and passes north in the foothills of the Sierra to about the latitude of San Francisco. The type locality may be fixed in Salinas Valley or the mountains close by on the west, probably not far from Jolon. It was described by Bachman in 1839, but was regarded by Waterhouse as the same as *californicus*, and for more than fifty years has been so considered.

(3) An exceedingly pallid form, inhabiting the hot south end of the San Joaquin Valley. This form seems to have escaped a name, and is here described as *Lepus tularensis*.

The type specimens of both *L. californicus* and *L. richardsoni* were collected by the botanist David Douglas in 1831, presumably on his overland journey from Monterey to Santa Barbara. In fact, Gray gives San Antonio as the locality for *californicus*. This was doubtless the old Mission of San Antonio, situated in the valley of the same name in the coast ranges west of Salinas Valley, a few miles south of Santa Lucia Peak and a little north of the present town of Jolon, Monterey County. *Lepus richardsoni* inhabits the same region, the western edge of its distribution joining the eastern edge of that of *californicus* along a line extending parallel to the coast from Jolon to San Luis Obispo. The collection of the Biological Survey contains specimens of *richardsoni* from Jolon, Paso Robles, and San Luis Obispo, and of *californicus* from a few miles west of San Luis Obispo. As Douglas states in a letter to Sir Joseph Hooker that he collected in this region and visited the Santa Lucia Mountains in lat. 36°, there is every reason to believe that the type specimens of both *californicus* and *richardsoni* were collected in the same general neighborhood.

Lepus tularensis sp. nov.

Type from Alila (in bottom of San Joaquin Valley), Tulare Co., California. No. 126,334, adult female, U. S. National Museum, Biological Survey Collection. October 25, 1900. Luther J. Goldman.

Characters.—Similar in general to *L. texianus deserticola*, but usually paler and more yellowish; size rather small for the *texianus* group; color pale buffy grayish with a yellowish tone; back only slightly grizzled with black hairs; nape patch *whitish;* face, particularly sides of face and neck, pale buffy yellowish or yellowish buff, only slightly grizzled by dark hairs; pectoral collar pale yellowish; black ear-tips not sharply defined below; thighs grayish clay color; underparts white, with only a tinge of pale yellowish buffy on the sides; skull long and slender; frontals and nasals very narrow.

Measurements of type specimen.—Total length, 558; tail vertebræ, 84; hind foot, 117.

Remarks.—*Lepus tularensis* is a pallid form inhabiting the hot Bakersfield-Tulare Basin at the extreme south end of the San Joaquin Valley, whence it extends over the adjacent Carrizo Plain on the west. In winter its domain is invaded by the foothill species of the surrounding region, *Lepus richardsoni* Bachman, both occurring at Alila, Bakersfield, and other points not too far from the base of the hills.

Lepus texianus wallawalla subsp. nov.

Type from Touchet, Plains of Columbia, Washington. Adult female, No. $\frac{2\,3\,9\,2\,3}{2\,1\,3\,2\,8}$, U. S. National Museum, Biological Survey Collection. Sept. 18, 1890. C. P. Streator. Original No. 271.

Characters.—In summer pelage similar to *L. texianus deserticola*, but upperparts darker; in fresh winter pelage similar to *eremicus* and *richardsoni*. Skull and hind foot small as in *deserticola* and *tularensis* (contrasted with the large-footed forms *texianus, eremicus,* and *californicus*). Compared with *deserticola*, the ears are shorter; hind foot slightly larger; color of upperparts decidedly darker, partly from much greater admixture of black hairs and partly from a dull buffy fulvous suffusion. In fresh fall pelage (middle October) *wallawalla* becomes strongly suffused with pale buffy fulvous, most intense on sides, and the pectoral collar is still more deeply fulvous. The top of head and sides of face remain grizzled gray (nearly as gray as in *richardsoni*), but a broad ring around the eye and the sides of the neck are pale fulvous, almost but not quite so pronounced as in *eremicus*. The fronts of the ears are finely grizzled fulvous brown, darker than in *eremicus* and less gray than in *richardsoni* and *deserticola*. In summer pelage the fulvous suffusion is lost, the eye ring becomes nearly white, the cheeks pale buffy gray with very little grizzling, and the pectoral collar pale yellowish buffy.

Measurements of type specimen.—Total length, 555; tail vertebræ, 95; hind foot, 126. Average of hind foot in 4 specimens, 127.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW AND LITTLE KNOWN KANGAROO RATS OF THE GENUS *PERODIPUS*.

BY C. HART MERRIAM.

The kangaroo rats, a group peculiar to the arid parts of North America, are represented by three genera—*Dipodomys*, *Perodipus*, and *Microdipodops*. The latter is very much more distinct from the others than they are from each other. *Dipodomys* and *Microdipodops* have been previously studied, and the species have been published, but up to the present time only a beginning has been made in working out the species of *Perodipus*. A study of the rich collections of the Biological Survey leads me to recognize nine new forms, which are here described. One of these, named *ingens*, is a very large animal for a kangaroo rat, equaling in size *Dipodomys spectabilis* from Arizona and New Mexico. It inhabits the hot Carrizo Plain and adjacent southern end of the San Joaquin Valley in California. Another species, *P. microps*, from Lone Pine, Owens Valley, is the smallest of the genus thus far discovered, being smaller even than *ordi* and *columbianus*.

A curious feature connected with the kangaroo rats of this genus is that most of the species and subspecies may be arranged in four groups according to size: The small *ordi* group, the slightly larger *montanus* group, the decidedly larger *agilis* group,

and *ingens*, the largest of all. Another interesting feature is that in many localities two species occur together, and in several places three may be found within a distance of a few miles. The various species appear to be highly sensitive to climatic conditions, and adhere very closely to definite zone positions. As a result, it is not uncommon in the Great Basin region to encounter two or three species in ascending from the bottom of a desert valley to the adjacent mountain slopes. The great majority of species belong to the Upper Sonoran zone, of which some inhabit the upper part, some the lower. A few belong to the Lower Sonoran and Transition zones respectively, and one species—*montanus* of Baird—apparently enters the lower edge of the Boreal.

Like the other kangaroo rats, the members of the genus *Perodipus* are primarily desert animals. A few species inhabit the bare open deserts, but most of them live in the brushy deserts, and at least two of the California species—*streatori* and *venustus*—live among the manzanita thickets of the mountain slopes—a very curious place in which to find a kangaroo rat. One of these species, *venustus*, inhabits the Santa Cruz Mountains, and was also obtained by the Goldman brothers and myself on the very top of Santa Lucia Peak, in the coast ranges, at an altitude of 6000 feet.

Note on Perodipus montanus Baird.

Dipodomys montanus Baird, Proc. Acad. Nat. Sci. Phila., VII, p. 334, 1855.

Perodipus montanus of Baird is a well-marked species, a little larger than *ordi*, but decidedly smaller than *agilis*, *longipes*, and *richardsoni*. It was collected by F. Krenzfeldt on Captain Beckwith's expedition, in San Luis Valley, south central Colorado, near Old Fort Massachusetts (now Fort Garland), from which point the Biological Survey has obtained a large series of topotypes. By a curious error, Dr. E. A. Mearns has identified the species with *Dipodomys elator* Merriam of Texas (Proc. Biol. Soc. Wash., XIII, 167, Oct. 31, 1900). Fortunately, Baird's type specimen of *montanus* is still in existence, in the U. S. National Museum. Comparison of this type with the above-mentioned series of topotypes shows them to be identical, and to differ widely from *Dipodomys elator* of Texas.

Doctor Mearns may have been misled by the fact that the fifth toe (really the thumb) which distinguishes *Perodipus* from *Dipodomys* is not apparent in the type specimen, for the reason that the hind feet were skinned down to the toes and the bones removed. In all other respects it

agrees with the topotypes of *montanus*. Externally it has the small ears and relatively small, pale, crested tail of *P. montanus*, thus differing widely from *Dipodomys elator*, which has larger ears and a long round tail ending in a pure white brush about an inch in length, below which the upper and under tail stripes are nearly black. The whitish tip in the type of *montanus* is widely different, and results from the wearing off or suppression of the pale brownish wash which usually suffuses the tips of the hairs. Some of the topotypes are in exactly the same condition and match the type perfectly.

In comparing skulls of topotypes of *P. montanus* with those of *D. elator*, it appears that *montanus* has weaker and narrower maxillary arches, narrower nasals, narrower premaxillæ, and narrower rostrum as a whole, and also differs in the enamel-face of the upper incisor teeth. In all of these characters, the skull of Baird's type specimen, although not fully adult and somewhat imperfect, agrees with the topotypes and departs from *D. elator*. Furthermore, *P. montanus* came from the neighborhood of Fort Garland at an altitude of nearly 8000 feet, in the upper part of the Transition zone, while *D. elator* came from Henrietta, Texas, at an altitude of less than 1000 feet and in the Lower Sonoran zone.

Perodipus montanus may be known from the following description:

Characters.—Size medium or rather small; tail rather short; ears small; upperparts dull buffy ochraceous, abundantly lined on the head with fine dark-tipped hairs; the back in summer pelage shading toward clay-color, produced by brownish tips to the hairs; end of nose above the small white tip indistinctly dusky; patch at base of whiskers dusky; upper or interior fold of ear pale fulvous, with a dark spot near the tip, followed by a small whitish point which comes over from the back side of the ear, which is mainly white; upper tail stripe pale brownish drab, normally continuous to extreme tip; under tail stripe narrowing toward tip, and often absent beyond end of vertebræ.

Skull.—Intermediate in size between *ordi* and *richardsoni;* rostrum, nasals, and premaxillæ rather narrow; bullæ rather large for size of skull; maxillary arch rather weak and narrow, but with well-developed rounded outer angle; supraoccipital and interparietal broad. The skull as a whole closely resembles that of *ordi*, but is larger, the total length averaging about 38 mm. instead of 36. The maxillary arch is actually only a trifle larger than in *ordi*, thus being relatively smaller.

Measurements.—Average of 40 specimens from type locality: Total length, 250; tail vertebræ, 140; hind foot, 40.8.

Perodipus ingens sp. nov.

Type from Painted Rock, 20 miles southeast of Simmler, Carrizo Plain, San Luis Obispo Co., California. Adult male, No. 128,805, U. S. National Museum, Biological Survey Collection. August 6, 1903. Luther J. Goldman. Original No. 777.

Characters.—Size huge, not only very much larger than the largest known species of *Perodipus*, but equaling *Dipodomys spectabilis*. Skull about double the bulk of the largest previously known *Perodipus*, and relatively heavy and massive. Color buffy ochraceous; upper and lower tail bands black, uniting at end of vertebræ, beyond which the pencil is white, superficially washed with dusky (chiefly on upper surface). Ears relatively small, actually not larger than in *agilis*.

Measurements.—Type specimen: Total length, 360; tail vertebræ, 191; hind foot, 54. Average of 6 specimens: Total length, 350; tail vertebræ, 190; hind foot, 52. Skull of type: Total length, 48 mm.; occipito-nasal length, 45; basal length, 34; zygomatic breadth, 23.5; breadth across bullæ, 30.5; breadth of frontals posteriorly, 17, behind lachrymals, 15; length of nasals, 18.

Remarks.—*Perodipus ingens* so greatly exceeds in size all known species of the genus that no comparison is necessary. Its range, so far as known, is the Carrizo Plain and adjacent southwestern border of the San Joaquin Valley. Specimens were collected by L. J. Goldman at three localities: Carrizo Plain (8 miles east of Simmler), Painted Rock (20 miles southeast of Simmler), and McKittrick (in western Kern County, about 35 miles west of Bakersfield). Whether or not it spreads over suitable parts of the Kern-Tulare basin remains to be ascertained.

Perodipus venustus sp. nov.

Type from Santa Cruz, Santa Cruz Co., California. Adult male, No. 51,852, U. S. National Museum, Biological Survey Collection. March 12, 1893. G. B. Badger. Original No. 46.

Range.—Santa Cruz and Santa Lucia Mountains, California.

Characters.—In size and general characters similar to *P. agilis*, but color *very much darker;* nose black, passing into black band at base of whiskers; top of head, back, and thigh patches dusky, finely grizzled with ochraceous, the ochraceous becoming more distinct on sides; ears large and nearly black, with the usual pale spots at base, and at top of fold; ankle, sides of heel, sole, and tail stripes nearly black; hairs of rump forming a black patch just in front of basal white ring of tail.

Skull.—Similar to that of *agilis* but slightly longer; maxillary arch of zygoma broader on outer side, with a pronounced outer angle (lacking in *agilis*); jugal weaker; nasals slightly larger (both longer and broader); premaxillæ broader; incisors heavier. Compared with *P. tularensis*, the nasals and premaxillæ are broader, the outer angle of maxillary arch less developed, the bullæ more projecting posteriorly.

Measurements.—Type specimen: Total length, 339; tail vertebræ, 211; hind foot, 46. Average of 14 from type locality: Total length, 316; tail vertebræ, 191; hind foot, 45.3.

Perodipus goldmani sp. nov.

Type from Salinas, mouth of Salinas Valley, Monterey Co., Calif. Young-adult male, No. 118,924, U. S. National Museum, Biological Survey Collection. September 4, 1902. Luther J. Goldman. Original No. 431.

Characters.—Size large, nearly as large as *venustus*, but tail shorter and ears smaller. Coloration intermediate between the paler *agilis* and the darker *venustus*. Upperparts finely mixed dusky and buffy ochraceous, resulting in a drab-brown which covers the head and back, becoming grizzled ochraceous on the flanks; dusky marks at base of whiskers and on ankles large and conspicuous.

Skull.—Similar to that of *tularensis*, but nasals and premaxillæ broader.

Measurements.—Type specimen: Total length, 312; tail vertebræ, 185; hind foot, 46. Average of 8 from type locality: Total length, 313; tail vertebræ, 185; hind foot, 45.4.

Perodipus agilis tularensis subsp. nov.

Type from Alila, Tulare Co., California. Adult female, No. 127,158, U. S. National Museum, Biological Survey Collection. June 23, 1903. Luther J. Goldman. Original No. 563.

Characters.—Externally like *agilis;* tail slightly longer. Skull similar, but maxillary arches more strongly developed, more broadly spreading, broader antero-posteriorly on outer side, and developing a prominent recurved angle; premaxillæ longer on top of skull (alongside nasals), constricting nasals more abruptly just behind anterior third; sides of fronto-parietal shield less parallel (approximating anteriorly). The skull resembles that of *panamintinus* (with which it agrees in size), but differs strikingly in the nasals, which are shorter, and anteriorly are broader and more abruptly spreading. The supra-occipital is narrower than in *panamintinus*, allowing the bullæ to come nearer together. Externally *panamintinus* is much paler. The skull of *tularensis* compared with that of *venustus* is slightly smaller, nasals and premaxillæ narrower, outer angle of maxillary arch more prominent, bullæ less produced posteriorly.

Remarks.—Specimens are at hand from Alila and Tejon Canyon.

Measurements.—Type specimen: Total length, 308; tail vertebræ, 182; hind foot, 41.

Perodipus montanus utahensis subsp. nov.

Type from Ogden, Utah. Adult male, No. 55,115, U. S. National Museum, Biological Survey Collection. July 15, 1893. Vernon Bailey. Original No. 4085.

Characters.—Similar to *montanus*, but hind foot slightly smaller and decidedly more slender; upperparts less fulvous and more drab or clay

color; ears darker, the anterior fold dusky except at extreme tip; under tail-stripe continuous to tip of pencil.

Skull.—Like that of *montanus*, but frontals narrower anteriorly, and tympanic capsule smaller (shorter), with the underpart weak anteriorly.

Measurements.—Type specimen: Total length, 260; tail vertebræ, 150; hind foot, 41. Average of 10 from type locality: Total length, 260; tail vertebræ, 147; hind foot, 40.2.

Perodipus streatori simulans subsp. nov.

Type from Dulzura, San Diego Co., California. Adult female, No. $\frac{33105}{45103}$, U. S. National Museum, Biological Survey Collection. November 24, 1891. C. H. Marsh. Original No. 255.

Characters.—Externally so similar to *streatori* that I have found no constant difference except that the end of tail is not white. In spring (end March) and early fall (August), and probably summer also, the color is paler and more ochraceous than in late fall (October). In October specimens the dusky of the back prevails over the tawny or pale fulvous tones.

Skull like that of *streatori*, but maxillary arch of zygoma less spreading laterally, and cranium less squarely rectangular. In a series of skulls of *streatori* placed side by side the maxillaries almost touch; in a corresponding series of *simulans* they are separated by an interval of about 4 mm.

Some specimens (about 1 in 10) of this subspecies appear to be intermediate between the genera *Dipodomys* and *Perodipus*, inasmuch as they lack the hallux or the hallux has no claw, thus having only 4 claws instead of 5.

Remarks.—This is a wide-ranging form. The Biological Survey collection contains specimens from Dulzura and Twin Oaks (near San Marcos) in San Diego County, and thence northward at least to Morro in San Luis Obispo County.

Measurements.—Type specimen: Total length, 280; tail vertebræ, 165; hind foot, 40. Average of 10 from type locality: Total length, 285; tail vertebræ, 172; hind foot, 41.

Average of 10 *streatori* from type locality (Carbondale, Mariposa County): Total length, 286; tail vertebræ, 175; hind foot, 42.

Perodipus cabezonae sp. nov.

Type from Cabezon, Colorado Desert, California. Adult female, No. 54,055, U. S. National Museum, Biological Survey Collection. May 31, 1893. C. P. Streator. Original No. 2859.

Characters.—Size rather small (between *ordi* and *panamintinus*); ears rather large; color buffy ochraceous. Externally most like *panamintinus*, but ear slightly larger; hind foot shorter; nose paler (usual dark patch obsolete); head and face more fulvous.

Skull.—Rather long and narrow; sides of fronto-parietal shield approximating anteriorly; maxillary arches compressed. Compared with *panamintinus* and *agilis* the maxillary arches are much less spreading, their outer margins slope more strongly backward, and the frontals are narrower between lachrymals (more wedgeshape).

Measurements.—Type specimen (female): Total length, 275; tail vertebræ, 162; hind foot, 42. Average of 8 from type locality: Total length, 282; tail vertebræ, 171; hind foot, 42.3.

Perodipus microps sp. nov.

Type from Lone Pine, Owens Valley, Inyo Co., California. Adult male, No. $\frac{25288}{32701}$, U. S. National Museum, Biological Survey Collection. December 22, 1890. E. W. Nelson. Original No. 138.

Characters.—Size small, as in *ordi* and *columbianus;* ears small and pale; color pale buffy ochraceous, much paler than *ordi* and *columbianus.*

Skull.—Small and rather narrow, and very different from that of any known species; compared with *ordi* and *columbianus,* braincase narrower; nasals narrower; premaxillæ broader; parietals (together) much more acutely pointed posteriorly; breadth of single parietal much less than length (in *ordi* length and breadth subequal), maxillary arch much weaker and more slender, without external angle; supraoccipital between bullæ narrower; incisors thinner (anteroposteriorly) and more vertical (less incurved).

Measurements.—Type specimen: Total length, 282; tail vertebræ, 165; hind foot, 41. Average of 5 from type locality: Total length, 270; tail vertebræ, 158; hind foot, 40.6.

Perodipus microps levipes subsp. nov.

Type from Perognathus Flat, Emigrant Gap, Panamint Mountains, California (altitude 5200 ft.) Adult male, No. $\frac{27176}{31575}$, U. S. National Museum, Biological Survey Collection. April 16, 1891. Vernon Bailey. Original No. 2668.

Characters.—Size small, little larger than *microps* from Lone Pine; ears small; color pale buffy ochraceous, as in *microps.* Skull small, with large posteriorly bulging bullæ, and narrow, weak maxillary arches. Compared with *microps* the hind foot and skull as a whole are larger; bullæ decidedly larger; parietals less acutely pointed posteriorly. From *P. cabezonæ,* which has equally large bullæ, it may be told at a glance by the small, narrow, weak, and tapering maxillary arches, and by the very much smaller ears.

Measurements.—Type specimen: Total length, 288; tail vertebræ, 156; hind foot, 43. Average of 10: Total length, 289.5; tail vertebræ, 164; hind foot, 42.4. Total length of skull 38, contrasted with 35 for *microps.*

Vol. XVII, pp. 147-150 October 6, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF NEW SQUIRRELS FROM MEXICO.

BY E. W. NELSON.

In 1651 Hernandez recorded the presence of flying squirrels in Mexico. The next record south of the United States was in 1861, when Tomes included it in his list of mammals taken by Salvin at Dueñas, Guatemala (P. Z. S., 1861, p. 281). In 1892 I saw a pair of mounted specimens in the museum of the State College at the city of San Luis Potosi. These were recorded as having been taken near Jilitla, in San Luis Potosi. During all of our subsequent work in Mexico, until the present season, whenever in suitable country, both Goldman and I have kept a constant but unsuccessful lookout for these animals. During April, 1904, while in the highlands of Chiapas, near the Guatemala border, Goldman was fortunate enough to secure a good pair of adult flying squirrels with skulls. In view of the striking differences between the Mexican and United States species of *Sciurus* it was a great surprise to find this isolated representative of *Sciuropterus* very closely related to forms found in the United States.

Both the forms of *Sciurus* described below are smaller and paler than their most closely-related subspecies occupying adjoining territory.

Sciuropterus volans goldmani subsp. nov.

MEXICAN FLYING SQUIRREL.

Type No. 132,833, adult male, U. S. National Museum, Biological Survey Collection. From 20 miles southeast of Teopisca, Chiapas, Mexico, collected April 8, 1904, by E. A. Goldman. Original No. 16,667.

Geographic distribution.—Highlands of Chiapas and Guatemala.

Subspecific characters.—Much like *S. volans querceti*, but top of nose white; postocular are a much darker; and underside of flying membrane deep ochraceous buff.

Description of type.—Top of head and upper parts of body nearly uniform reddish brown, slightly more reddish than in *Sciuropterus volans querceti;* upper surface of flying membrane blackish slate color; top of tail cinnamon brown; tops of fore-feet dingy whitish; tops of hind-feet dusky, toes dingy whitish; top and sides of nose, lower part of cheeks, and sides of neck to back of ears whitish; area between eye and ear dusky, shading down into dingy grayish brown on cheeks and sides of head below ears; supraloral spot whitish; underside of neck and body white with a pale suffusion of buff; underside of flying membrane deep ochraceous buff; underside of tail dingy buff. Ears large and broad.

Measurements of type.—Total length, 237; tail vertebræ, 112; hind foot, 30.

Skull characters.—Skull scarcely distinguishable from that of *S. volans querceti.*

Measurements of skull of type.—Basalilar length of Hensel, 28; interorbital width, 7.5; zygomatic width, 22; greatest width of braincase, 17.5; length of nasals, 10.2; width of rostrum, 6; depth of rostrum, 7.

General notes.—This flying squirrel is so closely related to *S. volans* that I have felt constrained to consider it a subspecies although its range is completely isolated by some hundreds of miles of intervening desert country from its nearest relative to the north. The resemblance between the Florida and Mexican flying squirrels is remarkably close; the white top to the nose, slightly more reddish upperparts, and rich fulvous on the underside of the flying membrane are about the only characters that distinguish the Chiapas animal. The lack of contrast between the top of the head and back, the dark postocular area, and the white nose separate it from Texas specimens.

Sciurus poliopus senex subsp. nov.

MICHOACAN SQUIRREL.

Type No. 126,208, adult female, U. S. National Museum, Biological Survey Collection. From La Salada, 40 miles south of Uruapan, southern Michoacan, Mexico. Collected March 14, 1903, by E. W. Nelson and E. A. Goldman. Original No. 16,127.

Geographic distribution.—Below 4,000 feet in the valley of the Balsas River (and tributaries) in central and southern Michoacan and adjacent parts of northwestern Guerrero.

Zonal distribution.—Arid tropical.

Subspecific characters.—Most like *Sciurus p. nemoralis,* but upperparts paler or lighter gray, nuchal patch more clearly defined yellowish; rump patch more obsolescent.

Description of type.—Top of head iron-gray; nape patch ochraceous mixed with black; rest of back pale grizzled gray with slight mixture of ochraceous grizzling posteriorly, but not sufficient to form a rump patch; sides of body paler than back; top of tail black with heavy wash of white; tops of feet white; underparts of body white; median area on underside of tail dull gray bordered with blackish; outer edge of tail white.

Measurements of type.—Total length, 543; tail vertebræ, 275; hind foot, 69.

Skull characters.—Rostrum heavier and braincase narrower than in *S. p. nemoralis,* with braincase more abruptly constricted posteriorly and occipital diameter shorter.

General notes.—Compared with a similar series of typical *S. p. nemoralis* (the most closely allied form) the present subspecies is distinctly lighter colored, the yellowish nape patch averages decidedly better defined, and the rump patch is scarcely or not at all appreciable in most specimens and poorly defined when present. In all except melanistic specimens the pale grayish wash on the back and sides is underlaid with buffy or yellowish similar in shade to the nape patch and varying in amount so that in some specimens it is scarcely distinguishable, but it usually shows through the overlying gray sufficiently to give a pale yellowish suffusion. As might be supposed from the climatic differences the tail is decidedly slenderer or less bushy than in *nemoralis* and the pelage much thinner and shorter haired. Melanism sometimes occurs in this form, as attested by one specimen taken.

Sciurus poliopus perigrinator subsp. nov.

PUEBLA SQUIRREL.

Type No. 70,279, adult female, U. S. National Museum, Biological Survey Collection. From Piaxtla, Puebla, Mexico. Collected November 25, 1894, by E. W. Nelson and E. A. Goldman. Original No. 7104.

Geographic distribution.—Southern Puebla, northwestern Oaxaca and adjacent parts of Guerrero.

Zonal distribution.—From upper Sonoran to arid tropical.

Subspecific characters.—Most like *Sciurus p. hernandezi* but more brightly colored; rump and nape patches well marked; underside of tail rusty red almost as in typical *poliopus.*

Description of type.—Top of nose and fore part of crown iron-gray; back part of crown and nape marked with a dark ochraceous buffy patch mixed with black; rest of upperparts to rump light iron-gray, underlaid and mixed with ochraceous; sides of body paler than back; rump with a distinct ochraceous patch mixed with black; tops of feet white; upperside of tail black with a strong wash of white and underlaid basally with rusty ochraceous; underparts of body rich cream-buff; underside of tail

with broad median area bright ochraceous bordered with black and edged with white.

Measurements of type.—Total length, 535; tail vertebræ, 273; hind foot, 69.

Skull characters.—Skull smaller and lighter than in *S. p. hernandezi;* bullæ smaller; outer end of nasals broadened, producing an inflated tip.

Number of specimens examined.—Five.

General notes.—The brighter colors of the nape and rump patches, the paler back, the reddish color of basal parts of hairs on tail, and the buffy underparts make a combination of characters which easily distinguish this form from its allies. One of these five specimens before me has the underparts pure white; and a half-grown specimen has the underside of the tail dull yellowish gray. The rump and nape patches while distinct are scarcely darker than the underside of the tail.

Vol. XVII, pp. 151-152 October 6, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF FOUR NEW BIRDS FROM MEXICO.

BY E. W. NELSON.

The birds described below were collected by Mr. E. A. Goldman during the spring and summer of 1904 while continuing the work of the Biological Survey in Mexico.

Porzana goldmani sp. nov.

MEXICAN YELLOW RAIL.

Type No. 193,712, adult male, U. S. National Museum, Biological Survey Collection. From Lerma, Mexico. Collected July 11, 1904, by E. A. Goldman. Original No. 10,994.

Geographic distribution.—Known only from type locality in the Valley of Toluca, Mexico.

Specific characters.—Generally similar to *P. noveboracensis* but darker, the wings, flanks, and rump slaty blackish; white markings on back in the form of transverse spots; bill slenderer.

Description of type.—Superciliary stripe, sides of head and neck dark buffy mottled with narrow blackish edgings to feathers; top of head and nape blackish obscurely streaked with narrow dingy buffy edges of feathers; middle of shoulders streaked equally with black and rather dark buffy; sides of shoulders, scapulars and tertials mainly black edged with dark buffy; the black middle of feathers marked with transverse oblong white spots (usually two on each feather); rump blackish with small white spots; primaries dark slaty; secondaries dark grayish with white areas as in *noveboracensis;* wing coverts blackish with small rounded white spots; chin and throat pale dull buffy shading on lower neck and breast into dark dull buffy with feathers on sides of breast tipped with dusky; belly

dull whitish; sides of body, flanks, thighs, and crissum dull black with spots and bars of white.

One specimen examined.

Empidonax fulvifrons fusciceps subsp. nov.

Type No. 193,713, adult male, U. S. National Museum, Biological Survey Collection. From Comitan, Chiapas, Mexico. Collected March 29, 1904, by E. A. Goldman. Original No. 10,625.

Geographic distribution.—Highlands of Chiapas and adjacent parts of Guatemala.

Subspecific characters.—In size and color of underparts like typical *fulvifrons;* upperparts darker; crown much darker and strongly contrasted with back.

Four specimens examined; from Comitan, Teopisca, and Tenejapa, Chiapas.

Arremonops superciliosus chiapensis subsp. nov.

Type No. 193,714, adult male, U. S. National Museum, Biological Survey Collection. From San Bartolomé, Chiapas, Mexico. Collected March 15, 1904, by E. A. Goldman. Original No. 10,533.

Geographic distribution.—Valley of the Chiapas River, Chiapas.

Subspecific characters.—Much like *Arremonops s. sumichrasti* but top of head darker, the median stripe on crown darker and grayer; back dark green as in typical *superciliosus;* distribution of buffy on underparts as in *sumichrasti* but color of a deeper or more creamy shade; size as in *sumichrasti.*

Nine specimens examined.

Telmatodytes palustris tolucensis subsp. nov.

MEXICAN MARSH WREN.

Type No. 194,074, adult male, U. S. National Museum, Biological Survey Collection. From Lerma, Mexico. Collected July 5, 1904, by E. A. Goldman. Original No. 10,950.

Geographic distribution.—Known only from Tuluca Valley, Mexico.

Subspecific characters.—Size less than in *palustris;* black dorsal area averages larger; rufous of back brighter; underparts much more reddish buffy.

Description of type (in worn breeding plumage).—Top of head blackish with traces of a brown median line; middle of back black with well defined white shaft streaks; rump and upper tail coverts rich reddish brown; middle tail feathers dull grayish brown mottled with darker and indistinctly barred with same basally; underparts dull dark reddish buffy (including pectoral area) becoming dingy whitish on chin and throat and middle of abdomen.

Measurements of type.—Wing, 51; tail, 40; culmen, 12; tarsus, 20.

Seven specimens examined, all from type locality.

Vol. XVII, pp. 153-156 October 6, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FOUR NEW BEARS FROM NORTH AMERICA.

BY C. HART MERRIAM.

Notwithstanding the large number of bears already known from North America, four more appear to require recognition. Three of these are from Alaska; the fourth is a small form of the Black Bear from the desert mountains of eastern Mexico.

Ursus eulophus sp. nov.

Type from Admiralty Island, southeastern Alaska. No. 81,102. Adult male. U. S. National Museum, Biological Survey Collection. 1896. Lieut. G. T. Emmons.

Characters.—Size large, equaling the Sitka bear; color said to be very dark brown. Sagittal crest remarkably high anteriorly; frontals extraordinarily elevated posteriorly; rather narrow interorbitally; frontal shield long and high and in a single flat plane sloping strongly upward from anterior third of nasals almost to fronto-parietal suture (not decurved posteriorly); braincase narrowed and compressed anteriorly, passing gradually into sagittal crest; rostrum rather narrow (as in *horribilis*, as contrasted with the broader *sitkensis*); maxillæ long, reaching back into frontals to beyond plane of nasals; interpterygoid fossa long and narrow; molars larger than in the grizzlies, fully as large as in *sitkensis;* lower carnassial slender, especially anteriorly; $m\frac{2}{2}$ narrower and less rectangular than in *sitkensis;* last lower premolar smaller and thinner than in *sitkensis;* incisors small, as in *horribilis* (very much smaller than in *sitkensis*, particularly the outer incisor).

Ursus kenaiensis sp. nov.

Type from Cape Elizabeth, at extreme west end of Kenai Peninsula, Alaska. No. 128,672. Adult female. U. S. National Museum, Biological Survey Collection. 1903. C. A. Lambert.

Characters.—Size large; skull broad, flat and remarkably massive, with exceedingly broad rostrum, not constricted at base, but spreading broadly into zygomata; zygomata broadly spreading; jugal very broad anteriorly; frontals depressed, flattened, low posteriorly; postorbital processes large, blunt, projecting horizontally outward from top of skull; *palate exceedingly broad;* nasals large and broad; anterior nares rather small. Canines small (as in the grizzlies); incisors and molars large. From *Ursus richardsoni*, apparently its nearest relative, it may be distinguished at a glance by larger size, broader palate, and by the form of the temporal ridges, which do not turn abruptly inward behind the postorbital processes. From *kidderi* and *phæonyx* it differs in greater massiveness; much broader rostrum, palate, and zygomata, and flatter frontals. Compared with *kidderi* the skull as a whole is shorter and broader; the incisors and canines of approximately the same size. Compared with *phæonyx* the skull is in every way larger, broader, and far more massive; the canines are approximately the same size; the incisors larger.

Ursus horribilis phæonyx subsp. nov.

Type from Comet Creek (5 miles below head), a tributary of Forty Mile Creek, near Eagle, Alaska. No. 133,231. Old female. U. S. National Museum, Biological Survey Collection. July 12, 1903. W. H. Osgood. Original No. 2684.

Characters.—Similar in general to *U. horribilis*, but claws shorter, more strongly curved, and dark blue-black [in *horribilis* long, flattish, and mainly white]. Ears rather short and *densely haired* on both sides. Color of skin dark brown.

Color.—Back and legs very dark brown, almost blackish brown; tips of hairs on back where not worn off grizzled; underparts and muzzle pale brown.

Cranial and dental characters.—Skull similar to that of *horribilis*, but zygomata more spreading, muzzle broader and shorter, especially broad anteriorly; canines heavier; *incisors decidedly larger.*

Measurements of longest (middle) claw of fore foot.—Over curve, 93 mm.; from top of base to tip, 75; from bottom of base to tip, 55.

Ursus americanus eremicus subsp. nov.

Type from Sierra Guadalupe, Coahuila, Mexico. No. 116,952. Adult female. U. S. National Museum, Biological Survey Collection. April 21, 1902. E. W. Nelson and E. A. Goldman. Original No. 15,111.

Cranial characters of female.—Size and general characters as in *amblyceps*, but frontals in the female *depressed* instead of elevated, the face line (in

profile) continuing from end of nose almost to parietals, thus bringing highest part of cranium far back over braincase [in *amblyceps* the highest part is over orbits, on plane of postorbital processes]; frontals flat [in *amblyceps* strongly convex, the sides decurved]; nasals smaller, more wedge-shape, and straight or nearly straight [in *amblyceps* the anterior third is strongly upturned]; rostrum more slender anteriorly; anterior nares narrower; occipitosphenoid length shorter; canines more slender; outer incisors decidedly smaller; upper molars slightly larger, more broadly and squarely truncate anteriorly [in *amblyceps* more rounded and retreating on inner side]. Naked nose pad very long; ears rather long.

Color.—Black, the woolly underfur very dark brown; muzzle dark brown in type specimen (old female), but light brown, almost yellowish brown, in half-grown cub.

Measurements (type specimen).—Total length, 1,290; tail, 66; hind foot, 210.

Remarks.—I have not seen an adult male from Coahuila, but if the animal inhabiting the Davis Mountains, Texas, is the same, the old female has a remarkable skull, the nose strongly pugged, the frontals rising abruptly much higher than in *amblyceps*.

Vol. XVII, pp 157-158 October 6, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW COYOTE FROM SOUTHERN MEXICO.

BY C. HART MERRIAM.

Among the specimens recently collected by E. A. Goldman in southern Chiapas, near the boundary of Guatemala, is an undescribed species of Coyote. It is much larger than any heretofore discovered in Mexico and may be known from the following description :

Canis goldmani sp. nov.

Type from San Vicente, Chiapas, Mexico, near Guatemala border. No. 133,204. Adult female. U. S. National Museum, Biological Survey Collection. April 25, 1904. E. A. Goldman. Original No. 16,725.

Characters.—Size large—largest of the Mexican species, larger than *lestes* and equal to *latrans* except that the rostrum is not so long.

Color.—Muzzle, top of head, ears, and legs fulvous; face grizzled grayish fulvous; some black hairs in ears; back grizzled buffy gray and fulvous; underfur pale fulvous, much paler than in *rigilis* or *cagottis*.

Cranial characters.—Muzzle rather broad; postorbital processes strongly developed; frontals deeply sulcate; bullæ very large, larger than in any known species; very broad and flattened on outer side; teeth large, those of female about as large as in male *cagottis*, except lower carnassial, which is decidedly smaller than in *cagottis*.

Measurements (of type, adult female).—Total length, 1,220; tail vertebræ, 355; hind foot, 216.

VOL. XVII, PP 159-160 OCTOBER 6, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SEA OTTER FROM SOUTHERN CALIFORNIA.

BY C. HART MERRIAM.

The Biological Survey has recently secured from Geo. M. McGuire, of Santa Barbara, the skeleton of an adult male sea otter killed July 2, 1904, on San Miguel Island, the most westerly of the Santa Barbara or Channel Islands, California. Sea otters were formerly abundant on these islands, but are now exceedingly rare and believed to be rapidly approaching extinction.

Comparison of the skull of this specimen with a series of skulls from Bering Sea (the type locality of *lutris*) shows the California animal to be a well-marked subspecies. It may be known from the following description :

Latax lutris nereis subsp. nov.

Type from San Miguel Island, Santa Barbara Islands, California. No. 133,508. Adult male. U. S. National Museum, Biological Survey Collection. July 2, 1904. Geo. M. McGuire.

Cranial characters.—Skull large, broad, and high, with long and high sagittal crest and swollen braincase. Compared with *lutris* the following differences appear: Skull as a whole less flattened, braincase more swollen and rounded, the sides (viewed from above) more convex and swollen, especially behind the constriction; anterior part of zygomata more broadly and squarely expanded; basioccipital forming an angle with basisphenoid; coronoid processes sloping strongly backward; sagittal crest much higher and more decurved posteriorly; inner cusp of large upper premolar (pm 3) elongated along anterior part of inner lobe (instead of conical) and showing a tendency to subdivide into two parts; 1st lower molar broader and more broadly truncate posteriorly.

The specimen in the flesh measured 6 feet in length.

Vol. XVII, pp. 161-162 December 27, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF THREE NEW SPECIES OF AMERICAN CRABS.

BY MARY J. RATHBUN.

A number of crabs were lent some years ago to the U. S. National Museum by the Zoological Museum at Copenhagen, for the author's use in a monograph of American Brachyura. As the completion of this publication is indefinitely postponed, the new species, the types of which are in the Museum at Copenhagen, are briefly described here.

Uca œrstedi sp. nov.

Type.—Male, from a lot of 2 males, 1 female, from Punta Arenas, Costa Rica; Mr. Œrsted, collector.

Surface uneven; a deep groove on outer side of gastric and cardiac regions is continued anteriorly in a transverse groove behind orbits, and posteriorly toward postero-lateral angle; a second longitudinal groove outside the first divides branchial regions unequally.

Front at base one-sixth as wide as distance between antero-lateral angles, gradually narrowing to a broadly rounded extremity. Antero-lateral angle little more than a right-angle; anterior third of side margin directed backward and a little outward; the margin then turns abruptly inward at an oblique angle and terminates above insertion of second pair of legs.

Larger palm coarsely tuberculate outside; inside an oblique ridge runs from lower margin to a point above middle, then turns at a prominent right angle toward supero-distal end of palm, where it joins the proximal of the two ridges parallel to base of dactylus.

Length of type, 12; width, 13.3; exorbital width, 12.1 mm.

Distinguished by deeply areolated carapace, strongly angulated side-margins and narrow front from all other species of the broad-fronted group.

Pinnaxodes meinerti sp. nov.

Type.—Male. Valparaiso, Chile; Mr. Kröyer, collector.

Near *P. hirtipes* Heller,* a specimen of which, from Port Otway,† is used for comparison. Carapace of our species wider; segments of legs shorter and broader; abdomen of male tapering from third to seventh segments, sixth not constricted; outer maxilliped of different form, merus joint tapering rapidly to distal end.

Length of type, 6.8; width, 7.9 mm.

Lophopanopeus nicaraguensis sp. nov.

Type.—Male. Realejo, west coast of Nicaragua; Mr. Œrsted, collector.

Carapace crossed by transverse lines of coarse granules,—on front, on epigastric lobes, 2 on each protogastric region, one at widest part of mesogastric region; on posterior branchial area a nearly longitudinal row of very short granulated rugæ which extend to posterior margin.

Front little more than $\frac{1}{4}$ width of carapace, median notch V-shaped, lobes most advanced near the notch, outer angles dentiform.

Antero-lateral teeth 5 (orbital included), thick, upturned, increasing in size from first to fourth. From the second a crest extends to buccal angle; fourth and fifth cristate above.

Chelipeds very unequal. Granules of palm form transverse reticulating lines; tubercles form two rows above, and near wrist tend to make longitudinal rows on outer surface. Fingers of large claw gaping, large basal tooth on dactylus, thumb deflexed.

Superior crest of carpus of legs unevenly granulate.

Length of type, 8.7; width, 13; width of front, 3.5 mm.

The ornamentation of the surface, the prominence of the lateral teeth and the absence of lobes from the carpal crests of the legs, distinguish this species from others on the west coast of America.

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* Reise Novara, Crust., p. 68, pl. VI, fig. 2, 1865.

† Proc. U. S. Nat. Mus., XXI, p. 607, pl. XLIII, figs. 10 and 11, 1898.

Vol. XVII, pp. 163-164 December 27, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW COTTOID FISH FROM BERING SEA.

BY HUGH M. SMITH.

[Contribution from U. S. Bureau of Fisheries.]

The steamer *Albatross*, while en route from Japan to America in 1900, made a series of dredgings on the coast of Kamchatka and about the Aleutian Islands. At one dredging station in Bering Sea, 150 miles north of the Rat Islands, there was obtained, on June 27, at a depth of 270 fathoms, a small sculpin representing a new genus and species.

Thecopterus, new genus of *Cottidæ*.

Similar to *Dasycottus* Bean, but with the dorsal fins connected, the branchial membranes joined to the isthmus, the preopercle with 3 spines, and the head and body destitute of tubercles and cirri.

Body short, compressed, deep, tapering abruptly backward from the large head; mouth moderate, terminal, the jaws equal; a band of villiform teeth in each jaw and a patch of teeth on vomer; three sharp preopercular spines; gill membranes united to isthmus; no slit behind last branchial arch; dorsal fins connected, the anterior incased in a fold of skin from which the tips of the spines project, the posterior dorsal similar to anal, both partly concealed by skin; ventrals small and short, the rays (apparently) I, 2; skin smooth, scaleless, the lateral line prominent and continuous.

From *Malacocottus* Bean, this genus differs in having vomerine teeth, no cutaneous filaments, connected dorsal fins, etc.

Thecopterus aleuticus, new species.

Head large, broad, little depressed, its length somewhat less than half total length and slightly exceeding its greatest depth and breadth; body compressed, abruptly tapering from dorsal origin to caudal peduncle, the depth of which equals three-fifths diameter of eye; greatest depth of body about equal to length of head posterior to snout; head with small asperities but no ridges or tubercles; snout broad, rounded, less than diameter of eye; eye large, one-third length of head; interocular space much less than eye;

mouth of moderate size, jaws about equal, maxillary extending to vertical from anterior margin of pupil, mandible broadly U-shaped with diverging rami; a rather broad band of villiform teeth in each jaw, and a patch of similar teeth on vomer; upper angle of gill-cover rounded and projecting across the lateral line; the three preopercular spines enclosing a small triangular space, the two posterior spines directed backward, the anterior outward; gill-rakers short; gill-membranes narrowly joined to isthmus; a continuous series of conspicuous lateral pores beginning under the first dorsal spine and extending on caudal fin; dorsal rays X + 14, the two parts united by a membrane whose height equals half diameter of eye; anterior dorsal rather high, its length about equal to eye and snout, the spines encased in a smooth dermal sheath from which their tips project;

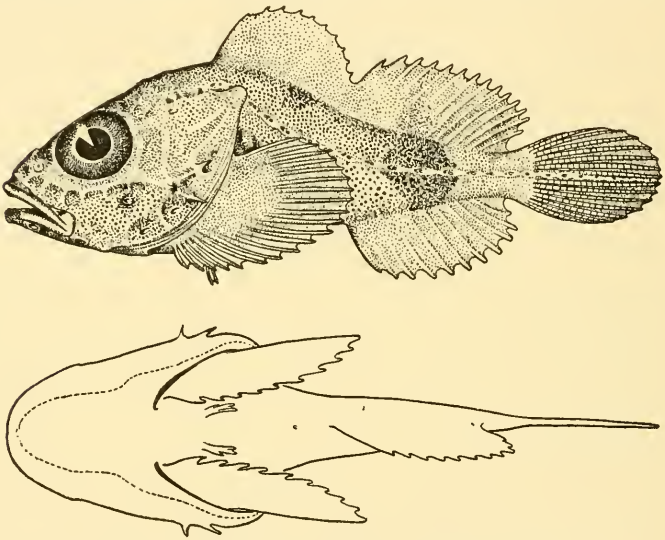

FIG. 1.—*Thecopterus aleuticus* Smith, new genus and species.

soft dorsal longer and higher than spinous, the anterior rays more or less concealed by skin; anal fin with 11 rays, immediately under the soft dorsal and similar to it; caudal rounded, about half length of head; pectorals large, rounded, of 20 rays, extending beyond origin of anal; ventrals very short, the rays I, 2*; anal opening considerably nearer to base of tail than to end of snout.

Color.—Entire body minutely speckled with black; a broad black band across body between soft dorsal and anal fins, another black band behind axil of pectoral; several small dark areas on head, body, and fins.

Type specimen 40 millimetres long, from *Albatross* station 3785, in Bering Sea 150 miles north of the Rat Islands, at a depth of 270 fathoms.

*Owing to the recent mislaying of the specimen, it is impossible to verify this rather abnormal formula for the ventral rays as determined independently by the author and the artist.

Vol. XVII, pp. 165-168 December 27, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

GYROSTACHYS SIMPLEX IN VIRGINIA.

Many years ago I found a large number of plants of this orchid near Fort Myer, Alexandria County, but the station has long been destroyed. On September 28, 1904, I found three plants in a pine wood in Fairfax County above the Great Falls. The above seems to be the first record of this small species for the State and the most southern.—*William Palmer.*

ZOSTEROPS FLAVISSIMA McGREGOR, PREOCCUPIED.

Dr. C. W. Richmond writes me that the above name employed by me for the silver-eye of Cagayancillo Island, P. I., (Bulletin Philippine Museum, No. 4) is preoccupied. Hartert used the same name for a species from Binongka Id., Tukang-Besi group, southeast of Celebes (Novitates Zoologicæ, X, April 20, 1903, p. 29). As the Philippine bird requires a new name, it may be called *Zosterops richmondi.*—*Richard C. McGregor, Manila, P. I.*

A CORRECTION OF BARROWS' RECORD OF COCCYZUS PUMILUS FROM CONCEPCION DEL URUGUAY.

In the *Auk* for 1884 (Vol. I, p. 28) W. B. Barrows notes the capture of three cuckoos at Concepcion del Uruguay, one on December 11, one on December 30, and the third on January 22, 1880. The first two he refers to *Coccyzus pumilus* Strickland (No. 117 of his list) and the last to *Coccyzus cinereus* Vieillott (No. 119 of his list).

I have lately examined these skins, preserved in the Museum of Comparative Zoology, and find that they all belong to *Coccyzus cinereus.* The December specimens are adults in perfectly characteristic plumage. The January skin is a young bird in a plumage that differs from that of the adult in the same manner that young of other species of *Coccyzus* differ from their parents. In wing and tail measurements it agrees with the

adults; the bill, however, is much smaller. The tail has the general indistinctness of marking peculiar to immature examples of *Coccyzus;* the wing feathers are narrowly edged and tipped with rusty; the throat and chest are plain ashy; the lower sides, flanks and under tail coverts are strongly washed with dull tawny-ochraceous. In one rather interesting point this specimen is peculiar — the outer pair of rectrices fall 18 mm. short of the other feathers, giving the tail a more fan-shaped and therefore more normal appearance than in the adult, which has a square tail.

It would have been, perhaps, hardly worth while to make this correction here had not Sclater, on Barrows' record alone, included *Coccyzus pumilus* in his Argentine Ornithology (Vol. II, p. 39), remarking that "the species was only previously known to occur in Venezuela and Colombia." In the Catalogue of Birds in the British Museum, Vol. XIX, 1891, p. 313, Shelley includes in his synonymy, under *Coccyzus pumilus*, a reference to Barrows' record, but does not allow that record to affect the distribution of the species, the habitat of which is given as "The Island of Trinidad,* Venezuela and Columbia."—*Outram Bangs.*

ON A SUPPOSED CONTINENTAL SPECIMEN OF SOLENODON.

There is in the Museum of Comparative Zoölogy a specimen of *Solenodon* that was sent in alcohol (entire and apparently fresh when immersed in the spirits) from the Isthmus of Darien, in 1871, by the late Dr. G. A. Maack. Twenty years later, on the strength of this specimen, Prof. Samuel Garman in his review of Flower and Lydekker's "An Introduction to the Study of Mammals Living and Extinct"† said: "We find *Solenodon* restricted to Cuba and Hayti though also found in Central America." This published statement brought forth for a time no end of comment, and Professor Garman defended himself by saying that there was the specimen and that there could be no question of its genuineness. In time the controversy died a natural death, and even Garman's statement that *Solenodon* occurs in Central America is probably now forgotten. Fearing, however, that one day the question was sure to be mooted again, I took the *Solenodon* out of its jar, skinned it, removed the skull and compared it with all available material. This I did with the utmost care, because if *Solenodon* does still occur on the continent—as does not seem altogether unreasonable in the light of recent discoveries‡—it surely must be different from either of the island species with which we are familiar.

The specimen in question proved indistinguishable in any way from Cuban examples, but, wishing another opinion than my own, I sent it to Gerrit S. Miller, Jr., who agreed with me that it unquestionably belonged

* Neither Léotaud nor Chapman give this bird as found in Trinidad, and I therefore doubt its occurrence there. See Chapman, Bull. Am. Mus. of Nat. Hist., Vol. VI, 1894, pp. 10–11, as to numerous birds wrongly attributed to the island.

† *The Nation*, No. 1381, Dec. 17, 1891, p. 477.

‡ The discovery of a Capromys-like rodent in the mountains of Venezuela—*Procapromys geaji* (Pousargues)—is not less astonishing, and much in the same line, as would be the existence of a *Solenodon* on the continent.

to the Cuban species—*Solenodon cubanus* Peters. In only one way is it at all peculiar—its fore-claws are very long and sharp and obviously had not been used in digging or scratching for insects for some time before its death, at once suggesting its having been kept in confinement.

The whole matter, therefore, of the continental record of *Solenodon* may be disposed of for good in a few words. The specimen (No. 3223, Mus. Comp. Zool.) is a perfectly characteristic example of the Cuban *Solenodon;* it was sent without comment or special data from the Isthmus of Darien by a reliable naturalist, but it has certain appearances of having been kept in confinement, and in all probability was brought alive from Cuba to Darien, where Dr. Maack secured it either still living or soon after its death. —*Outram Bangs.*

ON THE HABITS OF CAMBARUS UHLERI FAXON.

Cambarus uhleri, described by Faxon from a rather extensive series of specimens sent him by Dr. Philip Uhler, is apparently confined to the portion of Maryland known popularly as the Eastern Shore. According to Dr. Uhler and his collector, his specimens were found in ditches, even in places where the water was decidedly brackish.

Two years ago in Somerset County, and last summer in Dorchester County, I found the species rather abundant in burrows in low-lying areas not far from the bay but always near ponds or ditches of fresh water. In nearly every case the area selected was in dense pine woods.

The burrows were quite similar to those made by *C. diogenes*, and, like that species, *C. uhleri* erects a chimney over the mouth of its burrow. The chimney is usually rather low and can not represent any considerable portion of the earth removed from the hole, for in some cases this extended to a depth of 4 or 5 feet. A single individual invariably occupied a burrow and no communication between burrows was observed. In a lot of about a dozen specimens collected near Crisfield, in September, 1903, both forms of the male are represented; it would therefore appear that the time of ecdysis and transition from form II to form I must be in the late fall. From inquiries I learned that in the spring the animals emerge from their burrows and are common in ditches and small streams. This emergence, like that of *C. diogenes*, is doubtless for the purpose of mating, which having been accomplished, the crayfish returns to a burrow or digs a new one. The color of all the specimens observed was a dirty greenish brown, the tips of the chelæ alone being somewhat reddish. Dr. Uhler, in conversation, has reported that some of his specimens were beautifully marked with spots of golden yellow. Throughout the region mentioned the crayfish is known as the "*lobster*."

C. uhleri is unquestionably an offshoot from the *C. diogenes* stock and has probably reached its rather isolated range from the north. The examination of an extensive series of specimens from localities lying farther to the northward, but still on the Maryland-Virginia Peninsula, would be of great interest and would doubtless throw some light on the post-glacial distribution of our crayfishes.—*W. P. Hay.*

A NEW BOB-WHITE FROM THE UNITED STATES.

The advisability of naming this evident island race is perhaps somewhat doubtful for various obvious reasons, but as the sole existing specimen represents the characters of what I believe to be a strongly marked, small, non-migratory, alar degenerate race, I have decided to describe it. The Key West Bob-white is probably now extinct, though perhaps still rarely to be found.

Through the kindness of Mr. William Brewster I have been able to examine the only specimen as far as I know ever taken on Key West. The specimen was taken by a native and secured by Mr. J. W. Atkins. It is a male, original Scott coll., No. 6,086, Brewster coll., 46,670, taken July 5, 1888. Measurements taken in flesh as follows: lgth., $8\frac{9}{16}$; ext., $13\frac{1}{4}$; wg., $3\frac{13}{16}$ [81]; tar., $1\frac{3}{8}$; [30]; tail, 2 [51]. My measurements taken from skin: wg., 97; tail, 44; tar., 30; bill depth, 11; nost., 9; bill lgth., 14. Mr. Scott records the capture of this specimen and states that Mr. Atkins says that "Quail seem *almost* unknown to the inhabitants of Key West" and that the only additional records he has made there, are "one seen and another heard on May 11, 1888; one seen on May 22, 1888.

In a letter received March 28, 1903, Mr. Atkins writes me that he has not seen any Bob-whites on the island since 1888. The above specimen, he says, was shot out of a covey of four. The remainder were he believes shot by pot-hunters who were "relentlessly pursuing them."

Colinus virginianus insulanus subsp. nov.

KEY WEST BOB-WHITE.

Type: No. 46,670, Coll. of Mr. William Brewster, male taken at Key West, Florida, July 5, 1888. *Geographical Range:* Key West, Florida. *Subspecific Characters:* Crown uniform dark fuscous, forehead showing more white. Otherwise colored like *floridanus*. Size decidedly smaller.

—*Reginald Heber Howe, Jr.*

Vol. XVII, pp. 169-172 December 27, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SOME CHANGES IN CRUSTACEAN NOMENCLATURE.

BY MARY J. RATHBUN.

There has recently come into my hands, through the kindness of Dr. Charles W. Richmond, a copy of Fridericus Weber's "Nomenclator entomologicus secundum Entomologiam systematicam ill. Fabricii adjectis speciebus recens detectis et varietatibus," published in Kiel ("Chilonii") and Hamburg, 1795. Under the Agonata or Crustacea, pp. 91–96, many of the genera first described in J. C. Fabricius's "Supplementum Entomologiæ Systematicæ" 1798, are enumerated, and as they are accompanied by lists of species most of which were previously known, the genera themselves must date from 1795 instead of 1798. This has already been brought out by Sherborn in his "Index Animalium," 1902.

Both Weber and Fabricius had access to a manuscript by Daldorf, who had made large collections of Crustacea in the Orient and had classified them under a more elaborate system than had yet appeared in print. Daldorf never published his results, and unfortunately his two followers did not make similar use of his manuscript. It follows that the earlier and little known arrangement of Weber must supersede the long accepted one of Fabricius. In the majority of cases the composition of genera is essentially the same by both authors. There are, however, seven notable exceptions:

1. The Linnæan genus *Cancer* is abandoned by Weber, and among its dissevered parts we find the genus *Alpheus* for that group of crabs which three years later Fabricius kept as typical of *Cancer*. *Alpheus* Weber therefore may be considered a synonym of *Cancer*, and, as it is a synonym, it can no longer be employed for the macruran genus which has so long served as the type of the Alpheidæ.

2. The name *Crangon* appears first in Weber attached to the four species of shrimps which were later called *Alpheus* by Fabricius, viz., *acarus*, *tumulus*, *rapax* and *malabaricus*; all but the last were *nomina nuda* at that time, and therefore *malabarica* is the type of *Crangon*. In place of *Crangon* Fabricius 1798, we may use *Crago* Lamarck,* type *Crago vulgaris* (= *Cancer crangon* Linnæus).

3. In Weber we find the genus *Homarus*, which is usually attributed to Milne Edwards 1837.† As Weber used *Alpheus* to include the typical crabs, abandoning *Cancer* altogether, so he used *Homarus* for the lobster, crayfish, and other typical species of *Astacus* Fabricius 1775 and abandoned *Astacus* altogether. Instead of regarding *Homarus* Weber as a synonym of *Astacus* Fabricius, it is desirable to allow both names to stand each with the type later assigned to it, viz, *Homarus gammarus* (Linnæus)‡ and *Astacus astacus* (Linnæus).§ This is in accordance with Canon XXVI of the A. O. U. code, which follows an earlier and similar canon promulgated by the British Association.

4. *Parthenope* Weber 1795 contains six species, *fornicata*, *giraffa*, *longimana*, *regina*, *lar* and *dubia*. Of these the second and last three were *nomina nuda* at that date, leaving *fornicata* and *longimana* the only valid species. *Parthenope* Fabricius has up to this time been limited according to the specification of its type by Leach 1814, as *horrida* Linnæus, a species included by Weber not in *Parthenope* but in a list of doubtful species of *Cancer* listed in his introduction. Strictly speaking, the limitation of *Parthenope* took place at an earlier date than that of Leach. In 1801 || Lamarck formed the genus *Maja* by uniting *Inachus* and *Parthenope*, giving the type of the latter group as

* Syst. Anim. sans Vert., 159, 1801.
† Hist. Nat. Crust., II, 333, 1837.
‡ Milne Edwards, Hist. Nat. Crust., II, 333, 1837.
§ Latreille, Consid. sur les Crust., 422, 1810.
|| Syst. Anim. sans Vert, 154, 1801.

the species *longimana* Linnæus, for which in 1815* Leach forms the genus *Lambrus*. *Lambrus* therefore is a synonym of *Parthenope* Weber. The species *horrida* hitherto regarded as type of *Parthenope* needs a new generic name,—**Daldorfia.**

Lamarck† gives the type of the *Inachus* group as *eriocheles* Lamarck [= *Lithodes maja* (Linnæus)], but as this species is not included by Weber in the original species of *Inachus* it can not serve as the type, which remains as hitherto considered, *I. dorsettensis* (Pennant) 1777 (=*I. scorpio* Fabricius 1781).

A word as to the genus *Maja* Lamarck which was made to include *Inachus* + *Parthenope*. According to that rule of nomenclature, "If a later name be so defined as to be equal in extent to two or more previously published genera, it must be cancelled *in toto*," *Maja* must lapse. *Mamaia* has recently been published by Stebbing‡ for the species *squinado* formerly considered the type of *Maja;* but the reasons for the change have not yet been published.

5. *Eurycla* Weber has one species, *Hippa dentata* Fabricius 1793, which is later§ made the type of *Corystes* by Latreille. The species should be known as *E. cassivelaunus* (Pennant) 1777. It is worthy of note that in the Kiel Museum there is a dried specimen of this species with the inscription "*Eurycle dentata* F."

6. *Idotea* Weber contains two species, *adactila* and *armigera*, new name for *Astacus emeritus* Fabricius. In 1900‖ I showed that the first of these species, *adactyla*, is the type of *Hippa* 1787; and that decision is not altered in the light of earlier but similar removals of the various other species by Weber in 1795. The second species of *Idotea*, *emerita*, is therefore its type, but this species has been reckoned the type of *Emerita* Gronovius 1764 (not 1763) by Benedict,¶ and if this action be sustained, *Idotea* Weber becomes a synonym of *Emerita;* it is obvious that in any event *Idotea* is not available for a genus of Isopods as defined by Fabricius 1798. The inclusion of *adactyla* and *emeritus* in *Idotea* is referred to by Roux under *Idotea* in "Crustacés de la Méditerranée," 1828, but is there attributed to Daldorf.

* Trans. Linn. Soc. London, XI, 308 and 310, 1815.

† Syst. Anim. sans Vert., 154, 1801.

‡ Spolia Zeylanica, II, pt. V, p. 2, April, 1904.

§ Hist. Nat. Crust., III, 27, 1802.

‖ Proc. U. S. Nat. Mus., XXII, 301, 1900.

¶ Bull. U. S. Fish Comm. for 1900, vol. 2, p. 138.

7. *Ligia* Weber has three species, *inflexa*, *3 cuspitata*, and *granaria*; the first two are *nomina nuda*, the last is *Cancer granarius* Herbst, which is the megalopa stage of an undetermined crab. *Ligia* therefore may be considered a synonym of *Cancer;* and the name can not be used for an Isopod.

In consequence of changes in genera, the following names of families of Decapoda must also be changed: Alpheidæ to Crangonidæ, Crangonidæ to Cragonidæ, Corystidæ to Euryalidæ.

VOL. XVII, PP. 173-180 DECEMBER 27, 1904

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PLANTAE ANDREWSEAE.

BY AVEN NELSON.

It is a source of no little pleasure to find the number of those who are interested in the "wild flowers" constantly increasing. It is an added pleasure when the interest shown is directed to their preservation and propagation, as well as to their collection and study. In Mr. D. M. Andrews, of Boulder, Colorado, Rocky Mountain botany has found an appreciative student who approaches the subject from the practical as well as the theoretical point of view. It is true that Mr. Andrews' work has a commercial side to it since he is engaged (and most successfully) in the introduction of native Colorado plants. But that is merely establishing here a condition for the study of our flora that was practiced elsewhere under less favorable conditions in the pioneer days of western exploration. To understand this we need only recall how many of our best known species were described from plants grown in the English gardens from seeds secured by the earliest collectors. For purposes of study Mr. Andrews' plants are better since, being grown in practically their usual environment, they represent approximately normal development.

I would call attention to the fact that the course Mr. Andrews is pursuing incidentally furnishes the very best evidence of the validity of species. It were well in this day of multiplied species, if we might have many such tests as the following examples illus-

trate: I had inclined to the view that Dr. Greene's *Lithospermum albicans* was merely a whiter and slenderer form of *L. linearifolium* and I named some specimens in accordance with this view. Mr. Andrews had these species growing in his gardens and knew from their autumnal condition that they were different. To satisfy me he sent me abundant material of each, and I am now growing them in pots side by side. *L. linearifolium* goes into the winter with the next year's leaves well formed and constituting fully developed rosettes on the summits of the short branched crowns of the roots. *L. albicans*, on the other hand, possesses no evergreen leaves and the crowns of the less branched and deeper set roots are wholly naked. To see the two begin their development from their autumnal condition was completely convincing. One more example: The Colorado *Eustoma* we have called *E. Russellianum*. Mr. Andrews, noting that this species was well known as an annual, recalled that the Colorado specimens had not thus impressed him when he collected them. To satisfy himself he visited again the *Eustoma* patch in the mountains. After examining some hundreds of plants he found that not one had failed to develop, as a rosette, the next year's crown leaves. Further evidence that the plant is perennial, were it needed, he finds in the old stems that occasionally persist on the crowns.

Having been kindly permitted to examine some of Mr. Andrews' choice collections I wish to report the following results of my study. Knowing, as I do, the character of his work I account it a privilege to extend to him the recognition that appears in this paper.

All types are deposited in the Rocky Mountain Herbarium.

Asplenium andrewsii sp. nov.

Rootstock short, wholly enveloped in matted roots; stipes naked, ebeneous below, becoming green above, from 2–10 cm. long, somewhat angled or striate; lamina thinly herbaceous, deltoid-ovate or narrower, 3–10 cm. long, somewhat narrower at its widest part, bipinnatifid, diminishing nearly uniformly from base to tip; pinnæ lanceolate, the lower nearly at right angles to the rachis, the upper ascending, gradually diminishing and passing into the pinnatifid tip, all rather closely approximate and subopposite or the lower more distant (1 cm. or more) and alternate; pinnules 3–12 mm. long, ovate, more or less cuneate at base, sharply incised but cut not quite to the costa, sharply and somewhat incisely serrate; the veins

rather inconspicuous and but slightly divergent; sori short but nearly connecting to those in the successive lobes, so forming almost a continuous sorus from base to apex of pinnule; indusium straight, forced back and finally concealed by the sporangia.

Perhaps most nearly allied to *A. Bradleyi* D. C. Eaton but probably not very closely even to this. Mr. Andrews writes of it as follows: "The most interesting item on the list to me. I am sending a better specimen. It is certainly indigenous and grows on the south face of a white sandstone (alkaline) cliff extending along Boulder Creek for a mile or more, the ferns growing in crevices abundantly for nearly the whole distance. It is growing with *Cheilanthes Feei*, a specimen of which I send you. The sandstone is porous and is not entirely dry."

Nemexia herbacea melica subsp. nov.

Green and glabrous throughout except for the slight scabrosity on the veins on the lower face of the leaves; leaves broadly ovate, subcordate at base, subulate-apiculate at apex, thin, green above, pale and subglaucous beneath, 6–10 cm. long, 4–8 cm. broad, 7-nerved, the three central nerves larger than the others; petioles slender, 1–3 cm. long; peduncles of the staminate flowers slender, striate, shorter than the subtending leaf, those of the pistillate similar but stouter, also (even at maturity) shorter than the subtending leaf; sepals oblong-linear, about 4 mm. long, longer than the stamens; berry blue-black at maturity, 7–8 mm. in diameter; seeds 3 (in berries examined), large and very hard.

I hesitate to propose this as more than a variety. It is a near relative of *Nemexia* (*Smilax*) *herbacea* and is not readily separated from it by floral or fruit characters. If it becomes a species, *N. melica*, it must be on the following points: (1) Its habit:—Mr. Andrews writes of it as follows: "Strictly erect where it can cling to small trees and bushes, growing straight through and often out at the top, attaining a height of 2–3 m. Growing in the open, as it frequently does after the thickets have been cleared away, it twists about and becomes tangled." (2) Its very thin membraneous leaves. (3) Its actually and relatively shorter peduncles. (4) The large size of its sterile flowers. (5) The remarkably slender tendrils. (6) The sweet or honey-scented flowers in contrast to the carrion-like odor of the other. It furthermore is a good geographical species. True *N. herbacea*, widely distributed as it is, does not occur very near to the middle Rocky Mountains.

I take as type Mr. Andrews' specimens from Boulder Canon,—fruit in 1903, flowers (staminate and pistillate) in 1904. Dr. Francis Ranaley's No. 695, from the same locality, is the same.

Crataegus coloradensis sp. nov.

Leaves 4–5 cm. long, mostly broadly oval to orbicular in outline, sometimes a little narrower, or the upper half broadly triangular-acute; the

base rounded or somewhat cuneate, entire or minutely serrate; the upper half incisely and coarsely toothed with finer serrations on the teeth which are slightly calloused but not glandular, scatteringly ciliate-pubescent above, nearly glabrous beneath except on the midrib and primary veins which are noticeably ciliate-pubescent or hirsute, even at maturity; nearly full size when the flowers open; petioles moderately stout, short, rarely more than one-fourth or one-third as long as the blade; bark of the branches gray, irregularly furrowed and checked, with few rather large lenticels; the stoutish twigs glossy-brown (some of the young foliar twigs slender and green); thorns rather few, often nearly wanting on some branches, glossy brown, very variable as to length (3–5 cm.), straight or slightly decurved; corymb many flowered (10–20) broad or flat-topped, the pedicels hirsute-pubescent, rather slender, 1–3 cm. long; calyx tube very short, hirsute, its narrow lobes cut into long slender nearly cylindrical gland-tipped teeth; petals orbicular, about 8 mm. in diameter, crenately toothed; stamens 10, about 5 mm. long; styles stout, mostly three, rarely 2 or 4; the mature fruit large, 10–13 mm. in diameter, dark scarlet-red, tipped with the persistent calyx-lobes and filaments, the pulp juicy and well flavored, the 2–4 (mostly 3) nutlets rather large, slightly ridged on the back.

Mr. Andrews writes as follows of this species: "Both in flower and in fruit it is the most beautiful of the thorns which are native in this part of Colorado, and will compare favorably, I believe, with any American species. The type locality is Gregory Canon, growing with *Crataegus cerronis*. It is a low well-branched tree but rather more open than other sorts, about 10–12 feet tall, isolated specimens being very well rounded and symmetrical."

I know of no western species to which this is closely allied. What is probably the same thing (flowering specimens) was distributed by Crandall from the foot-hills near Fort Collins, 1898, as *C. coccinea macrantha*. Apparently from the same collection by Crandall is No. 4,151, Horsetooth Gulch, May 28, 1898, distributed by the N. Y. Bot. Gard., unnamed. I have it also from R. T. Young, of Boulder, in 1903, these specimens in blossom and later ones with immature fruit; again from the same collector in 1904, with nearly mature fruit. Mr. Andrews' specimens, flowers and mature fruit, are taken as the type.

Crataegus cerronis A. Nelson.

Crataegus cerronis A. Nels. Bot. Gaz. 34 : 370.

Since the above was published this species has been collected by L. N. Goodding at Slater, Colo., 1903. Excellent specimens are also at hand from Mr. Andrews. These specimens show some points that had to be omitted from the original description, viz.: fruit black, mostly less than 1 cm. in diameter, the amount of pulp small; carpels usually dissimilar, some of them being laterally flattened.

Eustoma andrewsii sp. nov.

Perennial from short vertical semifleshy roots with a somewhat enlarged crown or caudex; the old stems occasionally persisting but apparently usually separating from the crown by an articulation; stems simple below, more or less fasciculately branched above, 2–4 dm. high; leaves from elliptic-oblong below to lanceolate and acute above, mostly 3-nerved, 2–4 cm. long; the next year's crown leaves appearing in the autumn as rosettes which are persistent and evergreen; peduncles ebracteate, 3–8 cm. long; calyx deeply cleft, less than half as long as the corolla, the slender acuminations of its lobes being two-thirds of its length; corolla a deep purple, 3–4 cm. long, its tube nearly one-third of its length, its lobes elliptic-obovate; stamens short; the filaments rather thick, anthers sagittate, erect; style stoutish, scarcely longer than the ovary and shorter than the mature capsule.

My attention was recently called to this beautiful species by Mr. Andrews, who pointed out some of the essential distinctions between this and *E. Russellianum* (L.) Griseb. Its perennial character he tested in the field. "Of several hundred plants not one had failed to produce the rosette of leaves or buds for the next year's growth." Attention may also be called to the smaller deep-purple corolla and the absence of peduncular bracts.

Secured near Boulder, Colo., 1904. I have the same from Mr. C. S. Crandall, "Meadow at LaPorte, altitude 5,500 ft., Aug. 21, 1895."

Pleurogyne fontana sp. nov.

Glabrous throughout; stems slender, simple or with a few narrower erect branches, 1–4 dm. high; leaves linear, mostly narrowly so, thin with distinct midrib and two faint lateral nerves, 20–25 mm. long, the lowest soon deciduous and never rosulate; flowers in a narrow somewhat panicled raceme, having long, very slender pedicels, pentamerous; bracts foliar; sepals green, linear, resembling the bracts but shorter, usually 3-nerved as are also the bracts; corolla often surpassed by the sepals, its lobes elliptic-oblong, sub-acute, about 5-nerved; stamens half as long as the corolla-lobes; the anthers oblong; mature capsule translucent, numerously ovuled, ultimately as long as the sepals.

It has been customary to call the *Pleurogyne* of the Rocky Mountains *P. rotata*. This, I think, is not justified. That species seems to skirt the northern boundary of the continent, from Labrador and Greenland to Alaska. I can find no mention of it in the Rocky Mountains. Rydberg makes no mention of it in the Flora of Montana nor Howell in his Flora of the Northwest. Macoun gives it the distribution in the British Provinces previously indicated by Gray. There seems to be no good reason for the statement "and south in the Rocky Mountains to Colorado." The Colorado species which has passed as *P. rotata* and which here characterized under the name *P. fontana* seems to be closely circumscribed, being probably confined to north central Colorado and the adjacent border of Wyoming.

Differing in many minor points the most obvious difference is the different arrangement of the leaves, *P. fontana* being relatively naked below while in *P. rotata* the leaves are crowded or even rosulate at base.

P. fontana occurs infrequently in wet or springy grassy places in the mountains. Collections at hand: J. H. Cowen, South Park, Colo., Aug. 18, 1895; D. M. Andrews, Boulder Co. (wet meadow, 8,000 ft.), Colo., Sept. (?), 1904; A. Nelson, Crow Creek, Aug. 27, 1903 (Type).

Mimulus minor sp. nov.

Perennial by slender creeping rootstocks, more or less stoloniferous (the stolons short, leafy, slender and occasionally rooting in the mud); stems slender, simple or sparingly branched above, nodes variable in length (usually much longer than the leaves), only 1 or 2 dm. high; leaves 2–5 pairs, enlarging upwards, short-petioled or nearly sessile, ovate, 3–5 nerved, the largest rarely 2 cm. long, sparsely toothed; flowers 1–several, umbellately terminal on very slender pedicels which are 1–3 cm. long; calyx campanulate, about 1 cm. long, somewhat oblique, its teeth unequal and obtuse or subacute; corolla yellow, more or less purple dotted in the throat, about twice as long as the calyx, bilabiate, the dense yellow beard on the lower lip extending down the tube nearly to the insertion of the stamens; the upper lip lighly ciliate-hirsute along the veins.

The yellow species of *Mimulus* as is well known are extremely variable. The knowledge of this fact has lead to carelessness in determination and a "lumping" of species that does not seem to be conducive to clearness. The species here described has, in recent years, passed as a depauperate *M. Langsdorfii* Sims. This latter species is one of the largest, often attaining a height of one meter. Its stems are large and fistulous; its inflorescence racemiform, at length greatly elongated and often with a succession of racemes from the leaf axils. The flowers are large and much more than twice as long as the calyx. Its lower leaves are rather long-petioled, coarsely toothed or often somewhat lyrate; the uppermost are always connate-perfoliate and the largest leaves are always well toward the base of the stem. In fruit the teeth of the lower lip of the calyx are connivent tending to close the orifice. *M. minor* like *M. Langsdorfii* is either glabrous or puberulent, but the pubescence of the corolla in *M. minor* extends to the veins of the upper lip, and its calyx remains open.

The following specimens are at hand, all from Colorado: D. M. Andrews, 8, near Boulder, 1904 (Type); K. K. McKenzie, 352, Breckenridge, 1901; Rydberg and Vreeland, 5,658, Placer Gulch, 1900; W. W. Willard, 1,926, Twin Lake, 1898; H. N. Wheeler, 312 and 372, near Boulder, 1901; Baker, Earle and Tracy, 181, Bob Creek, 1898; Baker, 392, Gunnison Watershed, 1902.

Erigeron macranthus mirus subsp. nov.

Leaves few, thick, glabrous, pale beneath; root-leaves 4–6 cm. long, elliptic, their petioles as long or longer than the blades, margined and ex-

panding below to a somewhat sheathing base; stem leaves 3–5 cm. long, sessile and, like the root-leaves, elliptic and mostly obtuse; the uppermost ovate, acute; heads few, the rays very numerous (more than 100) long and very narrow; the involucre and peduncles brownish-purple, glabrous but under a lens seen to be covered with a close beady glandulosity.

This may be specifically distinct but the distinguishing characters are not readily stated. Its aspect is such as would not at once suggest *E. macranthus*. Its two or three large handsome heads, the relatively short and few coriaceous leaves and the dark peduncles and involucres with their glistening beady surface (under a good lens) suggests to one a plant as strange as it is handsome.

Secured on a partially shaded mountain slope, Boulder County, by Mr. Andrews, 1904.

Aster andrewsii sp. nov.

Forming patches or colonies of considerable extent by means of the creeping underground rootstocks; stems nearly erect, rather slender, nearly or quite simple, minutely granular-glandular, becoming glandular or viscid-pubescent above, brownish and more or less tinged with purple, expecially above, 2–4 dm. high; leaves rather numerous, broadly linear, acute at apex and slightly tapered at both ends, 3–5 dm. long, about 5 mm. broad, the uppermost somewhat reduced, indistinctly 3-nerved, ciliate on the margins, both faces sprinkled with minute nearly sessile glands; heads usually solitary-terminal, occasionally one or two greatly reduced and possibly always aborted heads appear in the uppermost axils; involucre low-hemispherical, about 15 mm. broad, half as high; bracts in about 3 only moderately unequal rows, linear-lanceolate, somewhat acuminate, the glandulosity like that of the stem; rays 20–30, a beautiful dark azure blue, linear-oblong, about 15 mm. long and 2 mm. wide; pappus a sordid white, the short akenes pubescent.

No closely allied species is known to the writer. The type by Mr. Andrews is from an open valley at about 9,500 ft. altitude, near Eldora, Boulder County.

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